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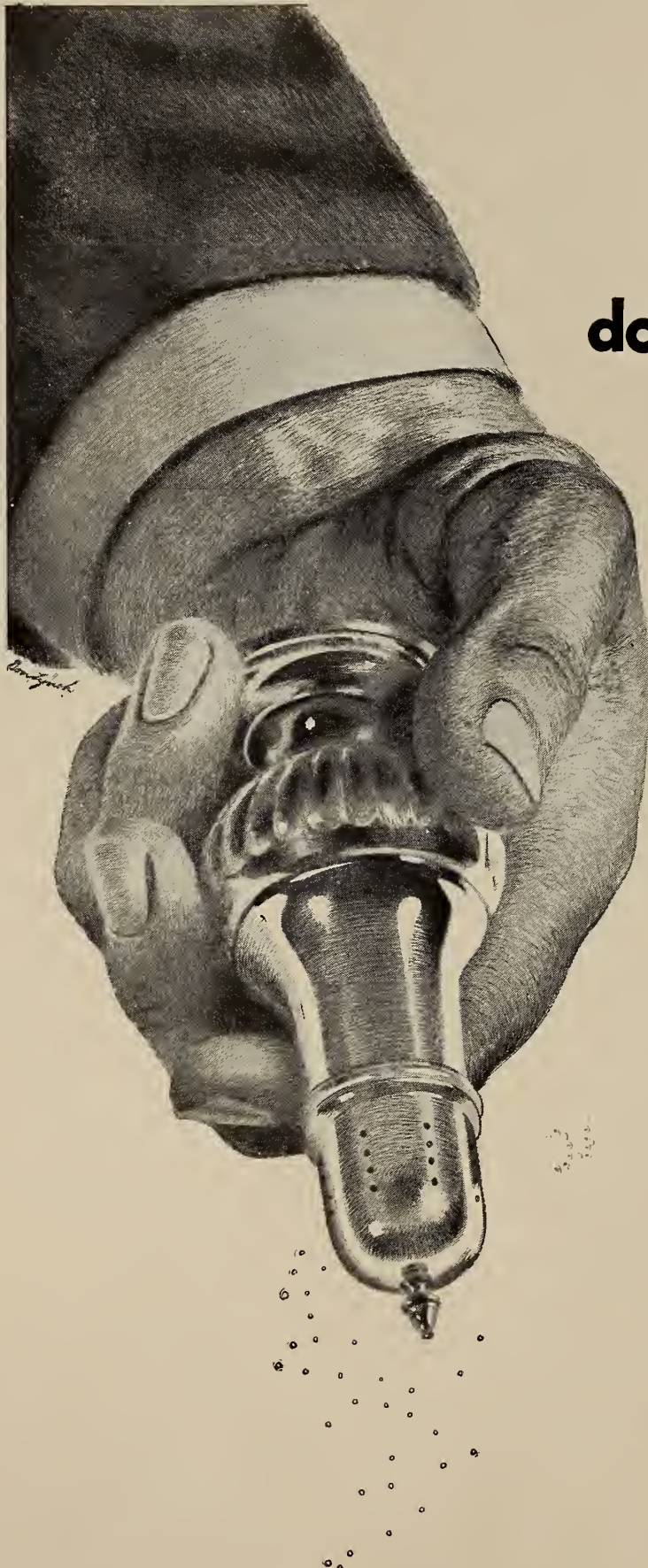
1950

VOLUME 25

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NUMBER 1

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INTERNATIONAL PROJECTIONIST

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HENRY B. SELLWOOD, Editor

Volume 25

JANUARY 1950

Number 1

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MONTHLY CHAT

A review of technological developments and other happenings in projection and allied fields during 1949.

JUST one year ago in this column appeared the following statement: "If the film industry is to continue as a healthy economic organism, it seems certain that the life-giving energy must flow from its technicians. . . . Three-dimensional pictures, stereophonic sound, and greatly improved color are but three of the advances long promised by the film industry; but it begins to look as though the Big Brass have become very coy about putting money into technological developments on behalf of an industry which, while the source of their opulence and personal power, might possibly be in for a bit of rough going."

Just how prophetic were these words is all too apparent a year later—and this despite the fact that while the aforementioned three technical advances have been available for not one but several years, no move was made to utilize them to bolster the sagging box-office.

This much having been said, we may proceed to review the year's happenings in chronological order, as culled from the pages of IP.

JANUARY: Eased into its grave was the concave screen. This product of muddled technical thinking and smart promotion died a natural death after IP, alone of any publication in the field, exposed its deficiencies, the while other papers were shouting hosannahs in its favor.

FEBRUARY: Announcement was made of the new Motiograph-Hall arc lamp. This high-intensity unit, rated at 75-115 amperes, employs a rotating arc and a 16-inch reflector. . . . The first pension payment under the Local 110 welfare plan was made. This plan is the first of its kind in theatrical labor history. . . . P. A. (Better Projection Pays) McGuire was tendered a testimonial dinner by the 25-30 Club.

The SMPE issued a 28-page booklet which, in outlining the status of Tv, warned the industry that the time to act was now. . . . A comprehensive survey disclosed that among Tv set owners movie theater attendance dropped 25%.

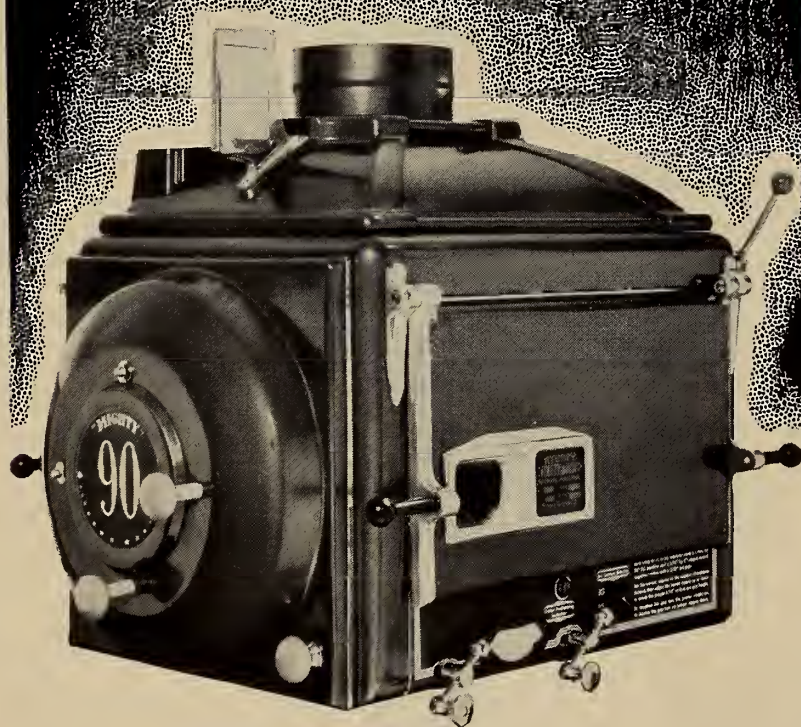
MARCH: IP published an article on "matched" projection optics which created a furor and precipitated a controversial exchange of views among technicians on both sides of the Atlantic which was to last for months. . . . Altec-Lansing demonstrated its Mini-Mike which, no larger than a stack of six dimes, won technical approval. . . . National Carbon Co. released data on its uncoated 9-mm high-intensity carbon, which at 80% side-to-center screen light distribution produced 15,400 lumens (no film, shutter or filters used).

APRIL: IP received reports from several
(Continued on page 29)

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The 35-mm Projection Positive Film

By ROBERT A. MITCHELL

III. The Preparation of Prints

THE chief light-sensitive compound in photographic emulsion is, as we have seen, silver bromide, an insoluble pale yellow substance. Emulsion is prepared and kept in the dark until such time as it is exposed to the action of light in the camera or printer.

The action of light on the emulsion is often not understood clearly. If an exposed film is taken out of a camera or printer and examined in the light, no change of any kind can be discerned. The emulsion looks exactly like unexposed emulsion. Yet a change of some sort undeniably takes place, for if an exposed film is immersed in a solution of a weak reducing agent, those portions of the emulsion which have been exposed to light turn black; those exposed to dim light turn gray, and those parts not exposed to light remain cream-colored.

The invisible picture-image produced in the emulsion by exposure in a camera or printer is called the *latent image*. The developer *reduces* the silver bromide to finely-divided metallic silver wherever the emulsion has been acted upon by light; and the stronger the exposure, the more complete is the reduction effected by the developer.

Developing Solutions

An ordinary reducing agent will not do for use as a photographic developer, however, because it would reduce *all* of the silver bromide, whether it had been exposed to light or not, completely fogging the film. A developer is a special

kind of very weak reducing agent. It is compounded to exert a *selective action* on the latent image, reducing only those particles of silver bromide which have been exposed to light.

The reducing agents most commonly used in developing solutions are metol, hydroquinone, pyrogallol, glycin, and amidol. The action of each of these *developers* is increased and modified by the presence of other chemicals in the developing bath—an alkali, a restrainer, and a preservative. Occasionally a fifth chemical which serves as a “stain preventive” is encountered in developing formulae.

Most developers (and here we are speaking of that component of a “complete developer” which does the actual developing) are neutral or slightly acid in water solution. In this condition they do not act readily as reducing agents.

The sodium salts of the common developers, however, actively reduce silver bromide. For this reason sodium carbonate or some other *alkali* is added to the developing solution. In addition to converting the developer into an active sodium salt, the alkali softens the gelatine and accordingly permits the developer to penetrate it more readily and act upon all of the silver bromide particles affected by light.

Restrainers, Preservatives, Anti-Stain

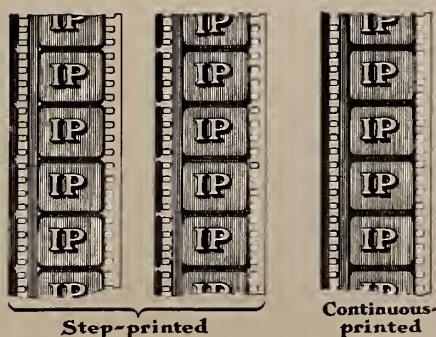
But the alkali renders the developer so active that a chemical fog may result from reduction of silver bromide crystals which have not been exposed to light. To control the action of the developer, thus making it as selective as possible, a *restrainer* of potassium bromide is added.

All reducing agents have a strong affinity for oxygen. In the case of photographic developing solutions, the air may oxidize them so quickly that they become discolored and unfit for use a short time after being prepared. A substance which combines with the oxygen of the air more readily than does the developer is accordingly added to the mixture. Sodium sulfite is such a *preservative*.

In a few developing solutions, especially those intended for motion picture film, an *anti-stain* such as citric acid is utilized. Citric acid prevents stains and discolorations by combining with oxidation products and metallic impurities to form inert complex salts.

A complete photographic developing solution therefore contains (1) developer, (2) alkali, (3) restrainer, (4) preservative, and (5) anti-stain. Many special

Comparison of printing processes.



developers dispense with some of these ingredients.

A bewildering number of developing formulae are available for every type of negative and positive emulsion. The following is a standard "MQ" (metol-quinone) developer for motion picture positives:

DEVELOPER:	
Metol	2 oz.
Hydroquinone	1¼ lb.
ALKALI:	
Sodium carbonate	7½ lb.
RESTRAINER:	
Potassium bromide	6 oz.
PRESERVATIVE:	
Sodium sulfite	12¼ lb.
ANTI-STAIN:	
Citric acid	4 oz.
Water to	30 gal.
Development time about 5 min. at 68° F.	

The 'Fixing' Process

Developing results in an image composed of black silver on unchanged cream-colored silver bromide. In time the remaining silver bromide would darken, and the picture would be all but lost. In order to render the image permanent, the unchanged silver bromide is removed, leaving clear film in its place. This process, called "fixing," depends upon the ability of a solution of sodium thiosulfate (commonly called "hypo") to dissolve away the unchanged silver bromide without affecting the reduced silver.

A simple hypo fixer is unsatisfactory for several reasons. The chemicals brought over into it from the developing bath decompose it and cause it to stain the film; and the prolonged soaking of the film in the bath softens and frills the gelatine emulsion.

These drawbacks are overcome by adding to (1) "hypo" an (2) acid to act as a "short-stop" and neutralize the alkali carried over from the developer, a (3) "sulfite" to prevent the acid from decom-

posing the hypo, and a (4) "hardener" to tan the gelatine, and thus prevent frilling and blistering. Following is a complete fixer for motion picture positive:

HYPO:	
Sodium thiosulfate	45 lb.
SULFITE:	
Sodium sulfite	12 lb.
ACID:	
Acetic acid (28%)	4 gal.
HARDENER:	
Potassium chrome alum	12 lb.
Water to	30 gal.

After fixing, the film is thoroughly rinsed and dried.

Reversal Developing

Reversal developing, a popular process for amateur ciné films, is carried out as follows:

- (1) The film, after exposure in the camera, is *developed* in the ordinary way, but fixing is omitted. The negative image therefore consists of reduced silver and unaffected silver bromide.
- (2) The developed but unfixed film is washed and then *bleached* in a bath containing potassium dichromate acidified with sulfuric acid. Bleaching removes the black negative image (the reduced silver) and leaves the silver bromide. After bleaching the film looks very much like undeveloped film, but careful inspection will reveal a faint positive image made up of the pale yellow silver bromide.
- (3) To remove any stain and to restore the full sensitivity of the silver bromide, the film is next *cleared* in a solution of sodium sulfite.
- (4) After another washing the film is *flushed* by exposure to white light.
- (5) The final step is *redeveloping* in a regular developing solution. In order to preserve the proper contrast values, this should be followed by fixing and washing. The film, originally used in the camera as a negative, now has a

positive image and is ready for use in the projector.

The silver images of ordinary black-and-white prints may be wholly or partly replaced by colored compounds or even dyes to give *toned* images. "Sepia" films are black-and-white prints toned to a rich chocolate-brown color. The two emulsions of duplitized color prints are dye-toned to the appropriate complementary colors. Combination toned and tinted prints, in which the dark portions of the image are one color and the light portions another color, were commonly used for pictorial and novelty reels in the days of silent motion pictures.

The Printing Process

Positive raw stock is supplied to film laboratories in 1000-ft. rolls which are securely wrapped to protect them from accidental exposure to light and packaged in round tins or fiberboard cartons.

Because the quality of undeveloped emulsion slowly deteriorates with age, producing fog, film laboratories receive their raw stock in small quantities at frequent intervals and avoid accumulating too great a surplus. The raw film is unpacked from the shipping crates and placed in a storeroom from which it is issued to the printing-machine operators as needed.

A printer is a machine designed to expose the positive raw stock to light which passes through the negative, thus forming an image of the negative picture or soundtrack on the emulsion of the positive. This is accomplished by drawing both films through a light-gate in which both films are kept in close contact, the emulsion side of one held firmly against the emulsion side of the other.

"Reduction" and "expansion" prints cannot be made by ordinary contact printing, and so require the use of projection printers. A case in point is the printing of standard soundfilm positives from silent-picture negatives, the individual frames of which require a lateral displacement to accommodate the soundtrack area of the sound print, and also a slight reduction in size. Other common examples are the printing of standard 35-mm positives from sub-standard (16-mm and 8-mm) negatives, requiring enlargement of the individual pictures, and the printing of sub-standard positives from 35-mm negatives, requiring reduction.

The two general types of printers used for printing the picture portion of films are designated as "continuous printers" and "step printers." The difference involves the manner in which the raw stock is exposed therein.

In printers of the continuous type the
(Continued on page 31)



High-vaulted emulsion-coating room at Kodak Park. Some idea of the size of this room and of the equipment therein may be had by comparing them with the size of the worker shown at the right.



He makes the camera concentrate on her...

NOT by chance is this escaping beauty the center of attention!

Before the scene was shot, the assistant cameraman made very sure she would be. He kept background and foreground from stealing her scene . . . made the camera concentrate on her and her alone.

In achieving such exact focus . . . in attending to many another detail vital to the camera's operation . . . the assistant

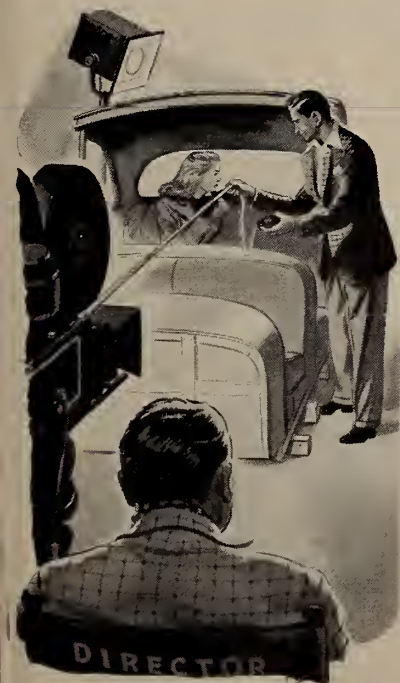
cameraman exercises a high degree of skill and displays an infinite capacity for taking pains.

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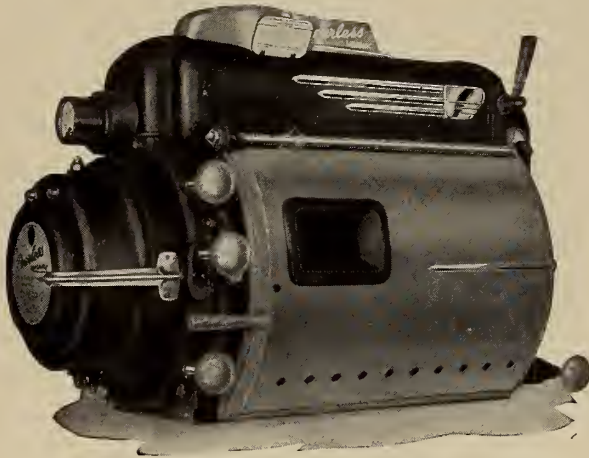
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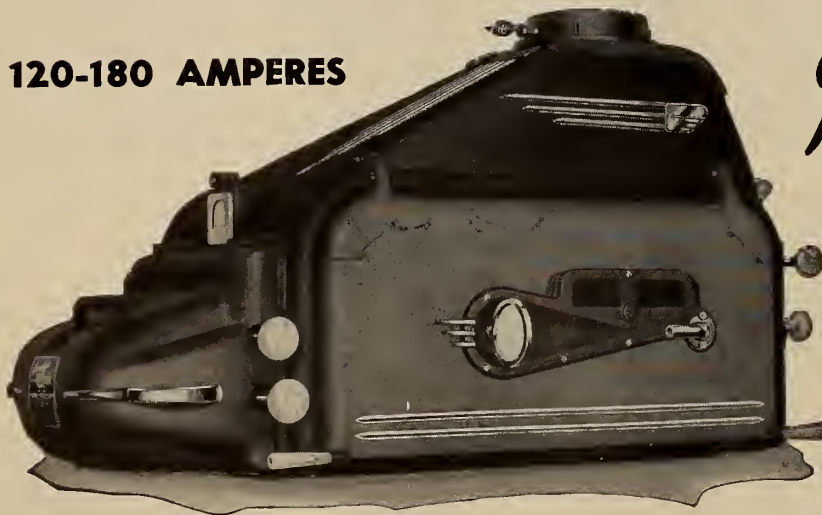


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"WHY EXPERIMENT?"



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Screen illumination in theater projection is limited by a maximum radiant-energy flux through the projector aperture. Excessive flux heats the film beyond its safe operating temperature, producing high-intensity effects in the film with loss of image quality on the screen and possible film damage. An increase of 30 to

60 per cent in permissible flux and in attainable screen illumination can be effected if film is cooled and its position controlled by high-velocity air jets directed at the film in the aperture. The high-intensity film effects are discussed and improvements in film behavior with air cooling are described herein.

MAXIMUM screen illumination obtainable in motion picture projection has been limited by a number of practical factors. In recent years with the development of more brilliant light sources, faster optics, and improvements in mechanical design, it has become apparent that the film itself is one limiting factor, and that it does not perform satisfactorily beyond a certain maximum intensity of radiation. This limit has already been reached with the lamphouses and projectors currently offered for the first-run, de luxe theaters.

Nevertheless, the realization that more light could be used to advantage has been increasing. Especially significant has

ness level would improve comfort and convenience as well as permit more illumination of the surroundings.

Focus vs. Radiation Intensity

The first discussion of the problems of film behavior under the high projection intensities necessary for maximum screen light was given by Carver, Talbot, and Loomis,¹ who pointed out the in-and-out of focus phenomenon and showed its dependence upon radiation intensity. The work described in the present report is a natural sequel to this earlier discovery.

Basically, the maximum permissible radiation on film is set by a maximum film temperature. Film is heated during

audience is seated, and thus there can be an increase in apparent screen brightness without an increase either in total light upon the screen or in total radiation incident upon the film.

2. Reduce the Heating Effect of Non-visible Radiation

Film is subjected to an amount of infrared radiation which, in the light from a modern high-intensity carbon arc, is approximately equal to the visible energy; all of this infrared can be as effective as the visible in heating the film but contributes nothing to the brightness of the projected image.

Such infrared radiation can be reduced by filters which absorb the infrared and transmit the visible; a theoretically perfect filter (removing all of the infrared and transmitting all of the visible) would permit a doubling of the permissible screen illumination without increasing the resultant heating of the film.

In addition to the heating produced by infrared radiation, there may be heating by other "useless" radiation. Any energy incident upon the film which does not contribute to the brightness of the projected image, tends needlessly to increase film temperatures.

On some projectors, the shutter arrangement permits radiation to fall upon the film during the time that none is transmitted to the screen; in other equipment, the film is illuminated by a cone of light of greater aperture than the projection lens can accept. Finally, some "indirect heating" may be experienced, if the spill-over illumination intercepted by aperture baffles, and so forth, is allowed to raise the temperature of the film trap and other metal surrounding the film path.

3. Increase the Cooling of the Film

Energy absorbed by the film during projection goes only partly into raising the film temperature, since some energy is reradiated from the film to cooler surroundings, and some is lost by convection to the air.

If the amount of energy that the film loses can be increased, there can be an increase in the amount absorbed, with no rise in film temperature. One method of increasing the rate of heat loss from the film is to impinge a high-velocity air jet upon it so that the coefficient of heat

AIR COOLING of Motion Picture Film for Higher Screen Illumination[†]

By F. J. KOLB, Jr.
Eastman Kodak Company

been the growth in popularity of the outdoor theater, where the viewing conditions demand an unusually large screen area—by comparison with indoor standards—if the seating capacity is to be made large enough for the theater to operate profitably. This larger screen size should be accompanied by an increase in total screen light in order to keep the screen brightness at a satisfactory level.

There have been other, although less pressing, reasons for increasing total screen light for indoor theaters, as well as for background projection, and for 16-mm projection. In these cases, little increase in screen size would be attempted, but an increase in the bright-

projection by a net absorption of energy in the photographic image, and the high-intensity projection effects result from the unknown, but fairly definite, temperature levels that the film reaches in the aperture. There are at least four ways of increasing the brightness of the projected image without increasing correspondingly the thermal misbehavior of the film:

1. Increase the Directional Effect of the Projection Screen

A screen that is not a good diffuser can concentrate the reflected light into a beam whose angle is more nearly limited to that angle within which the

¹ E. K. Carver, R. H. Talbot, and H. A. Loomis, "Effect of High-Intensity Arcs Upon 35-mm Film Projection," *J. Soc. Mot. Pict. Eng.*, vol. 41, pp. 69-87; July, 1943.

[†] *J. Soc. Mot. Pict. Eng.*, Dec., 1949.

transfer from film to air is considerably increased.

4. Restrict Film Motion Mechanically

As will be described later, some of the high-intensity effects limiting the radiation intensity on film appear as an undesirable film motion during the projection interval when film is supposed to be steady in the gate. In some cases, this motion can be restricted or prevented by mechanical means, such as the glass plates used on each side of the film in some viewers, or the forces exerted by streams of air directed at the film in the projector aperture.

This report covers only the application of the latter two methods of increasing permissible screen illumination, that is, increased cooling of the film, and mechanical restriction of film motion.

Heating of Film

Film is heated during projection because the photographic image has a net absorption for radiation, both visible and infrared; in addition, it transmits some radiation and scatters some radiation, and, as its temperature rises above that of the surroundings, it loses energy by convection to the air and radiation to the surroundings.

All of the net absorbed radiation acts to raise the film temperature, so that 1 watt of visible radiation absorbed by the film is as effective in raising film temperatures as 1 watt of infrared radiation or 1 watt of mixed radiation.

Additional evidence for believing that only the image absorbs energy is given by the behavior of dye-image films which are relatively transparent in the near-infrared region, even for relatively high absorption and density in the visible. Such dye-image films show less heating and less of the thermal effects than silver-image film does when projected at the same intensity. We have found this advantage of dye-image films to be roughly proportional to their transparency in the infrared.

What actual temperature the film reaches during projection is an interesting question that has never been answered satisfactorily. Obviously, the limitations of pull-down time, together with the limitations of the size of the film, make direct experimental measurement extremely difficult.

High-Intensity Effects

When film is projected at these higher intensities, a series of phenomena occur, depending upon the particular projection intensity being studied. Listed in order of their appearance with increase in radiation intensity, these effects are summarized in Table I.

Of these phenomena, negative drift is an entirely normal film characteristic which is present to greater or lesser ex-

TABLE I.
HIGH-INTENSITY PROJECTION OF FILM

Projection Phenomenon	Intensity Threshold Mean Net Watts/Mm ²
1. Negative drift	...
2. Embossing	0.20-0.30
3. Change in reflected image tone	0.30
4. Focus drift	0.35-0.40
5. Image flutter	0.40
6. In-and-out of focus	0.50
7. Blistering	0.60-0.65

tent in all cine projection. Embossing and the change in reflected tone have never, in our experience, contributed any deleterious effect to screen quality.

Focus drift is perhaps a necessary evil that must be tolerated if maximum projection intensities are to be used. Image flutter is usually visible only to a critical observer, but in-and-out of focus and blistering are two phenomena which make it impossible to obtain a satisfactory screen image: they take the control of image quality completely out of the hands of the projectionist.

Accordingly, it may be said that the first four of these phenomena are necessary or at least harmless occurrences, while the fifth is borderline, and the last two must be avoided.

Negative Drift

It has been shown¹ that film in the aperture is almost never flat and that its position bears no relationship to the curl or other physical shape it may have either entering the top of the projector gate or leaving the bottom of the gate.

Film in the aperture under the influence of the light beam behaves as though the emulsion surface were expanding with reference to the base dimension, so that each frame is distorted into a pincushion shape with the emulsion surface on the convex side; since the edges are held, the center of the frame is displaced toward the arc.* This is a perfectly normal phenomenon occurring in all cine projection.

High-speed pictures taken into the aperture show the center of the frame beginning to move toward the light source (which in our convention is called motion in the negative direction) from the first instant of its exposure to light. During the passage of the flicker blade, a partial recovery is effected, and with the second exposure to light the negative drift resumes and is carried to its maximum amplitude.

* This conclusion assumes standard emulsion position for theater projection. If the emulsion position is reversed and the film is threaded emulsion to lens, as in some process projectors, and much 16-mm projection, it is still the emulsion surface that expands with reference to the base; accordingly the center of the frame is now displaced toward the projection lens. This paper assumes theater standard emulsion position throughout; if the results are to be applied to projection with the nonstandard emulsion position, the direction of film motion with respect to the projector will be reversed for negative drift, focus drift, image flutter, in-and-out of focus, and positive drift.

Just how far negative the film drifts depends upon the intensity of incident radiation: the greater this intensity the greater will be the film motion. Under projection conditions approximately that of a first-run, de luxe house, we have observed film motion of approximately 0.020 to 0.025 inch from the flat plane as a reference. With intensities in excess of what film will stand for repeated projection, we have observed a maximum negative drift of approximately 0.045 inch.

Embossing of the Film

At higher levels of projection intensity (and the first-run, de luxe houses have now reached this value), embossing of the film is observed. This is a permanent film deformation, resembling an incomplete recovery from the negative drift just discussed.

Actually, two types of embossing are observed: (a) frame embossing, wherein the entire area of each frame appears to be raised slightly above the normal surface of the film—as a row of separate pincushions—and (b) image embossing, wherein the dark and light areas of the image are seen by reflected light to be at slightly different elevations from the nominal film surface. These two types of embossing probably begin simultaneously somewhere in the range of mean net radiation intensity 0.20 to 0.30 watt per square mm.

Of course, at the lower intensities the embossing is minute, and can be observed only with difficulty when the film is examined under low-angle reflected light. With increasing intensities, the amount of embossing increases until it can be seen when the film is examined under normal illumination.

Even when the film is severely embossed so that the center of each frame is displaced as much as 0.005 to 0.010 inch from the film plane, we have never observed any deterioration of image quality or any visible indication on the screen that this film is different from unembossed film.

Change in Reflected Image Tone

Some types of film, after projection at higher intensities, show a change in reflected image tone even though the image tone by transmission is not affected. This phenomenon appears somewhere in the region of 0.30 mean net watt per square mm. Film thus affected shows a warmer tone when the film itself is examined by reflected light, and the tone

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of the frame is seen to be different from the original tone of the unprojected frame lines and film edges.

No satisfactory explanation has been offered for this phenomenon: it is one of those occurrences which, though interesting, have no influence on the quality of the projected image.

Focus Drift

As the projection intensity is increased still further, it is observed that the projectionist must now refocus occasionally during the projection of a single reel of film. This appearance of focus drift begins somewhere in the region 0.35 to 0.40 mean net watt per square mm.

Depending upon the circumstances, there may appear to be a rather sudden change in focus with the transition from scene to scene, even though there is no splice in the film at this transition. Or it may appear that there is a gradual loss in sharpness of the projected image obtained at the start of the roll, and this must be corrected by occasional focus resharpening.

At intensities where this phenomenon occurs, we believe the only satisfactory solution is more constant attention by the projectionist. The influence of this effect can be minimized, however, by the technique of the initial focusing.

Every projectionist has observed that in the setting of the projection lens there is some leeway over which the projected image remains approximately equally sharp. It is apparent that if the lens is set at the mid-point of this tolerance, slight film motion in either direction may not exceed the depth of focus of the projection lens; if, however, the lens should be focused at the limit of its tolerance, film motion in one direction will be obvious immediately as a softening of the picture detail.

If the projectionist acquires the habit of setting his lens at the approximate mid-point of this depth of focus, the necessary focus corrections will be minimized.

This focus drift is apparently the result of a gradual variation in the amount of negative drift of the film at various points in the roll, induced perhaps by changes in moisture content, degree of exposure to air, and other intangible variables of film handling. When the amount of negative drift is small, variations in the amount pass unnoticed, but with the increase in magnitude of negative drift at higher intensities, some of these variations may be large enough to exceed the 0.002- to 0.004-inch tolerance in lens position for maximum screen sharpness.

Image Flutter

Beyond the limit of radiant-flux density at which film can be projected without image difficulty, the first warning is a

softening of the focus—which we have called “image flutter.” The picture is still reasonably sharp upon the screen and it might well be that to the theater audience no lack of quality would be apparent.

However, when we project test films which we know to be printed sharply and in which we are familiar with the best quality that can be obtained—so that any departure is obvious—we observe a softening of focus and a loss in detail that cannot be corrected by shifting the projection lens. In other words, at the point of best focus, the image quality is slightly less than optimum.

This is a preliminary to in-and-out of focus, which is observed with the next increase in radiation intensity, and may be produced by the same basic phenomena. There is a sharp transition, however, since image flutter is visible only with careful examination, while in-and-out of focus is immediately obvious even to the most uncritical audience.

In-and-Out of Focus

As the projection intensity is increased, a point is reached where the normal negative drift of each frame in the aperture is modified, and continued projection at higher intensities eventually replaces the negative drift with an actual positive drift or displacement of the film in the opposite direction.

The appearance and degree of positive drift are a function of the radiation intensity, together with the previous projection history of the film. We have observed a maximum positive drift of about 0.045 inch.

During the time when all the frames show negative drift, or the time when all frames show positive drift, a sharp steady picture can be focused upon the screen. In the transition period, however, it appears that some frames reach the point of positive drift ahead of their adjacent frames, and high-speed motion pictures show that some frames go negative, while others near by go positive.

The limits of these two opposite film motions exceed the depth of focus of the projection lens and the phenomenon of in-and-out of focus is observed. Under these conditions, no one setting of the projection lens will focus all frames equally sharp, and the transition from negative to positive is so rapid and unpredictable that the projectionist has no possibility of following it.

Film that is going in-and-out of focus is completely unacceptable for theater projection. We have observed that in-and-out of focus occasionally may be observed at projection intensities of 0.40 mean net watt per square mm and that, beyond an intensity of 0.50 mean net watt per square mm, in-and-out of focus

is almost certain to occur within the first five to ten days of projection in the theater. (In-and-out of focus, as well as many of the other focus effects, can be accelerated by abnormally high moisture content of the film.)

Blistering of the Film

With the increase in projection intensity to still higher levels, the film is observed to blister during projection. These blisters form in the film base immediately adjacent to the emulsion, where maximum base temperatures are reached. Depending upon the conditions of their formation, these blisters may be so small that the separate blisters are indistinguishable to the naked eye, or they may reach a diameter of approximately 0.005 inch.

Once blisters appear, the film is useless for further projection, since the thermal isolation of the emulsion directly over the blister causes it to reach so high a temperature as to burn off and disappear. The unburned blisters show on the screen as dark spots resembling the sudden appearance of severe grain in the image, and the burned-through blisters show as white areas on the screen surrounded by obviously charred emulsion.

The exact level at which blistering appears is dependent upon the type of film under consideration, but for release positive, a mean net flux of 0.60 to 0.65 watt per square mm is required. It should be pointed out, however, that in-and-out of focus appears only after repeated projection, while blistering may be observed on the very first run.

Accordingly, in an untested setup the in-and-out of focus threshold may be exceeded and even the blistering threshold passed; film projected under such conditions will blister rapidly and nevertheless require a number of projections of the blistered film before in-and-out focus is observed. This represents an extreme case, however, and it is safe to say that tested equipment *already shown safe for in-and-out of focus* will not blister release positive.

It is apparent that the high-intensity effects which depend almost entirely upon film temperature can be modified or prevented only by preventing the film from reaching these damaging temperatures. High-intensity effects that are influenced not only by temperature but by other factors sometimes can be postponed even though the temperature threshold is exceeded.

[To be Concluded]

Records Light Source Colors

A “recording spectro-radiometer” has been developed for comparing and recording the colors of light sources. The instrument breaks up beams into their component colors and makes a graphic record of its measurements of the intensities of these colors.

CONCLUSION

FROM its early beginnings, the idea of Tv in color has intrigued the imagination. As the motion picture industry has discovered, the mere fact that a production is offered in color rather than in black-and-white increases the public's interest and makes for far greater salability. The first proponent of color Tv was CBS, which for many years operated both black-and-white and color stations in New York City.

Shortly after the war, CBS felt that its color Tv system was ready ***, and on September 27, 1946, it petitioned the FCC to promulgate rules and engineering standards authorizing commercial Tv in color in the ultra-high-frequency band (480 to 920 megacycles). The CBS proposal, developed at a cost of some \$2,-

wheel at the transmitter. The eye saw the picture in full color.

At the same hearing, RCA gave evidence concerning a different system of color Tv, but did not request the FCC to approve its system at that time. In the RCA system, known as the simultaneous system, each picture was scanned simultaneously in three colors—red, green, and blue—and these transmissions were sent simultaneously on three different channels and were combined at the receiver to produce a color image.

After the issuance of the March, 1947, report denying CBS's color proposal, CBS turned its attentions in the Tv field mainly to the building of its monochrome network. But both CBS and RCA continued color experiments.

In October, 1948, CBS demonstrated to FCC staff members a sequential color system, using only 6 megacycles of band-

FCC on July 11, 1949, issued its notice of further proposed rule-making in the allocation proceedings, and stated definitely that it would give consideration to proposals for color Tv on both the very-high-frequency and the ultra-high-frequency Tv channels, providing that any such proposal must permit operation in a 6-megacycle channel and must be such that existing receivers will be able to receive color transmissions "simply by making relatively minor modifications in such existing receivers."

In a recent speech, one FCC Commissioner explained that the FCC would not authorize color:

(1) until color can be received satisfactorily on today's ordinary Tv receiver with only relatively minor modifications, and

(2) until color Tv pictures can be received in black-and-white on present-day receivers, with perhaps no, or only relatively minor, modifications.

While it is impossible to predict what evidence concerning color Tv will be presented to the FCC in the now scheduled hearings, and it is likewise impossible to foretell what action the FCC will take on color Tv, the motion picture industry obviously must consider color in connection with its planning concerning theater Tv. Not only must theater Tv interests be aware that broadcast Tv in color will be a much stronger competitor than black-and-white, but they must take into account that color may well be much more attractive to the public than either monochrome film or monochrome theater Tv.

Theatre Tv in Color

Theater Tv in color, therefore, deserves careful investigation. Such an investigation may reveal that theater Tv in color holds sufficient promise of becoming a box-office attraction in its own right to justify the conclusion that the motion picture industry should enter the theater Tv field on a broad scale.

From the technical viewpoint, color would require further development of the theater Tv equipment mentioned in this article, but it is not unreasonable to expect that color could be adapted to theater Tv with at least no greater difficulty than it could be applied to broadcast Tv.

Theater Tv in color would also have its impact on the frequency-allocation problems now facing theater Tv. While it appears that broadcast color Tv, if sanctioned by the FCC, will be limited to a 6-megacycle bandwidth, the theater Tv interests will be forced to inquire whether they should limit their interests in color to a system of this bandwidth.

The advantages of a wider bandwidth,

Theater Television: What, How and When*

By JOHN EVANS McCOY and HARRY P. WARNER†

000,000, looked toward the creation of 27 color Tv channels in the ultra-high-frequency band, each channel being 16 megacycles wide. This proposal would have appropriated substantially all of the ultra-high frequencies for color.

After lengthy hearings, the FCC on March 18, 1947, denied the petition, primarily for the reason that "many of the fundamentals of a color-Tv system have not been adequately field-tested and that need exists for further experimentation."

CBS, RCA Color Systems

The CBS proposal contemplated authorization of the so-called sequential system in which each picture is scanned through separate color filters—red, green, and blue, in turn. Under that proposal the transmissions in the separate colors followed each other at the rate of 48 per second. The three colors were accepted by the receiver by means of a color wheel containing filters of red, green, and blue, which rotates in front of the Tv screen in synchronization with a similar color

width. The system could be operated either with a rotating color drum or with stationary color filters. At the same time CBS demonstrated that an ordinary commercial 10-inch table Tv receiver (monochrome) could be converted so as to receive the color transmissions either in black-and-white or in color.

Receiver Obsolescence

Interest in color Tv flared brightly in May, 1949, when the FCC issued a public notice in which it stated that in reopening the pending allocation proceedings it planned "to afford an opportunity for the submission of proposals looking toward utilization of all Tv channels (both very-high-frequency and the ultra-high-frequency) to 6 megacycles monochrome or color on an optional basis in such a way as to permit reception on the ordinary Tv receiver with relatively minor modifications."

Following up this announcement, the

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† NOTE: The opinions and conclusions stated are the personal views of the authors.

including greater definition, greater frame rate, greater picture brightness, and less flicker, may well make it desirable for theater Tv to seek more than a 6-megacycle band for theater Tv relays. However, before a bandwidth wider than 6 megacycles is adopted for theatre Tv, it will be necessary to consider whether the existing common-carrier facilities for intercity relay of Tv programs could be adapted for such a wide-band video transmission.

Color faces many obstacles before it can be expected to take its place beside monochrome Tv, but the place it holds in the imagination of the public makes it a factor to be considered carefully by the motion picture industry.

Co-operative Theatre Groups

The foregoing discussion indicates that theater Tv is technically feasible and within the pocketbook range of the majority of exhibitors. Our next inquiry is what can be done with a co-operative system from a programming standpoint; will theater Tv be economically feasible and can it compete with Tv broadcasting, and what effect and impact will theater Tv have on motion pictures and broadcasting.

A word of caution is appropriate at this time. Theater Tv is just emerging from the laboratory stage; its experimental phase is just about to begin. We have no statistical data to buttress our conclusions. The latter are of necessity tentative and may warrant revision in the light of future developments.

Program material for theater Tv can be derived from:

1. Tv broadcasting, or
2. Independent sources. The latter term has reference to programs secured by and through the co-operative group engaged in theater Tv.

If the co-operative group seeks program material from the Tv broadcast station or network, it is beset with certain legal problems. Section 325(a) of the Communications Act of 1934 prohibits a station from rebroadcasting the programs of another broadcast station without the express authority of the originating station. This tenders the question of whether the pickup and transmission of a Tv program to a theater is a "rebroadcast" requiring the permission of the originating station.

Program Re-broadcast Rights

This point has not been adjudicated either by the FCC or the courts. It is believed that when Section 325(a) was enacted into law, it was the intention of Congress that the originating station or system should have the right "to control its program after it has been thrown into the air." This suggests that the cooperative group of Tv theaters would be re-

quired to secure the permission of the Tv broadcast station or network.

In the event that Section 325(a) is construed by the FCC and the courts as not to require the consent of the originating station, the theater Tv group would be precluded by common law and statutory copyright from re-televising the programs transmitted by a Tv broadcast station.

The court undoubtedly will hold that the production of a Tv program—i.e., news, sports, variety show, and so forth, involving as it does the expenditures of skills in the use of the camera, effort,

Video Straws in the Wind

SEVERAL recent news items relating to the sensational progress made by home television during 1949 are appended hereto of IP's firm belief that they are of immense significance to the motion picture industry in terms of probable sharp impact upon motion picture attendance:

There will be 20 million Tv sets in American homes within the next five years, which will make for an audience of approximately 75 million people, according to RCA board chairman David Sarnoff. Noting that RCA will turn out its millionth Tv set in February of this year, Sarnoff predicted that sets would be produced in still greater number as increased mass production makes this possible. Now operating in the U. S. are 98 Tv stations.

• • •

Total sales of Tv sets in the New York City area passed the million mark during the recent Xmas week. More than 472,000 sets were sold throughout the U. S. during November of last year, bringing the national total to 3,497,000.

• • •

Estimating that Tv sets in the Washington, D. C., area now exceed 87,000, National Broadcasting has upped its Tv advertising rates by 25%. Last rate card was issued in April, 1949, when there were 40,800 sets in the area.

• • •

J. Arthur Rank, British film producer whose pictures are distributed in the U. S. by Universal-International, has signed a deal for the distribution over American Tv outlets of 75 feature films. Some 50 of the films have not yet been released theatrically in the U. S. Entire product was made since 1944, with 11 having played the "art" theater circuit in the U. S. Rank states that he considers balance of the 75 films "not suitable for commercial distribution in America." (Says he.)

• • •

Six generating sets which recently went into operation in an Ohio power plant will have two Tv sets which will "watch" the water level and indicate whether all oil lighter flames are burning before pulverized coal is fed to the furnace. Each set employs a Tv camera which is connected by coaxial cable to a receiver in a centralized control room.

and monies—result in the establishment of a common-law copyright. This common-law copyright is the exclusive property of the station and network, and the former may prohibit the co-operative group of Tv theaters from re-telecasting such programs.

Common-Law Copyright

Common-law copyright is illustrated by the litigation arising out of the Louis-Walcott fight. A Pennsylvania court enjoined a motion picture exhibitor from picking up and re-telecasting the Louis-Walcott fight in his theater, because of the common-law copyright in the telecast which was the property of the sponsor, network, and station.

A Tv station or network can protect its programs by copyrighting the same. The copyright of a dramatic program prohibits the reproduction of the same unless a license is obtained from the copyright proprietor. The unauthorized exhibition of a copyright program would subject each exhibitor to minimum statutory damages of \$250 for each unauthorized telecast.

Thus, the co-operative group of Tv theaters would be precluded from using the program material of a Tv broadcast station or network, unless the latter consented. A Tv network might find it economically feasible to make its commercial or sustaining programs service available in theaters for a stipulated fee.

Program Availability

On the other hand, and as will be subsequently developed, theater Tv may be a competitive threat to Tv broadcasting and the Tv network may refuse to make its program service available to theaters. This means that the latter must obtain its own programs. This raises the next question: what independent programs are available to the theater group?

An excellent source of programming would be local or national news. Since a news event—i.e., a political address, parade, or fire—is a public event, any organization may transmit its own version of the event to the public via Tv broadcasting or to theaters by theater Tv. All that is required to carry a news program is a mobile unit to transmit the program to the central distribution point, for redistribution to the theaters. Outstanding national events could be made available to all theaters.

A second source of programming is sports events. Thus, boxing bouts and baseball and football games could be brought into the theater. The use of sports events in theater Tv tenders certain economic and legal issues which warrant discussion.

Not only are the Tv broadcast rights to an athletic contest available for sale

(Continued on page 27)

★ LOOKING BACK—TO THE FUTURE ★

This department, a regular IP feature, is a review of fundamental technical data.

The Language of Lighting

I

THE use of the candle in the definition of light units is a natural outcome of the fact that measurements of light were first seriously undertaken at the time when the newer light sources began to replace the candle. A similar situation led to the introduction of the term "horsepower" when steam engines began to replace the horse.

It was soon found that in order to use a candle as a standard, it had to be made according to strict specifications regarding size and ingredients, and burned under prescribed conditions. The light in a horizontal direction would then have a certain intensity which could be taken as a standard.

A value for the standard of luminous intensity was established in 1909 by an agreement effected among the three National Standardizing Laboratories of France, Great Britain, and the United States, and is now maintained in these laboratories by means of incandescent lamps.

Luminous Intensity in C.P.

This unit may be used to specify the luminous intensity in candlepower of any light source in a given direction and represents the light density in that direction. However, the candle-power measured in one direction gives no indication of the

at one given point—a measurement which is useful for certain purposes, but which is of no value in determining the total quantity of water in the pool. Just as it is necessary to know the dimensions of a pool and the depths at all points before its total contents can be established, so it is necessary to know the candlepower of an illuminant in all directions before its total light output can be determined.

This fact that candlepower in one direction does not indicate total amount of

indicated in Fig. 2. In *A* the candlepower of light radiating in only one direction is measured. When a number of readings are taken at uniform intervals in a horizontal plane, as indicated in *B*, and then averaged, the result is the mean horizontal candlepower of the light source.

Instead of taking a large number of individual readings, this result is obtained in ordinary practice by rotating the illuminant rapidly about its vertical axis while a single reading is taken. The intensity of light in all directions may be

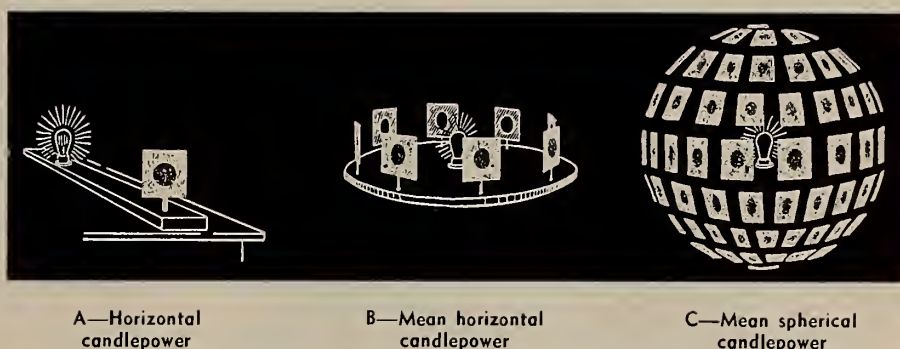


FIGURE 2. MEASUREMENT OF CANDLEPOWER

light produced is illustrated in Fig. 1. In each instance the candlepower in the direction of *P* is measured by means of an instrument known as a photometer. The reading obtained from the bare candle as shown in *A* is one candlepower.

Photometric Readings

In *B* the same candle is surrounded by a sphere having a moderately large opening. Assuming that none of the light rays are reflected from the inside walls of the sphere, the photometer still will indicate one candlepower despite the fact that a large portion of the total light from the candle has been absorbed.

In *C* a sphere with a much smaller opening is illustrated; and still more of the light is consumed by the sphere; but even in this case the light in the direction of the photometer is 1 candlepower. In fact, the reading will be 1 candlepower irrespective of the size of the opening and regardless of light allowed to be emitted, provided the direct rays from the candle to the photometer are not obstructed.

Three ways in which candlepower measurements are ordinarily made are

ascertained as indicated in *C*, by measuring the candlepower of uniform intervals around the light source.

An average of these readings will give the mean spherical candlepower of the illuminant. In the past, it was quite common to rate light sources in terms of this unit, since it is directly related to the total light output of the lamp. At the present time, however, a unit known as the lumen is much more commonly used for this purpose.

The Term 'Lumen'

Light is not a concrete object which may be weighed or touched, but is rather a form of energy in motion. For this reason, an amount of light cannot be strictly measured in the usual manner of measuring quantities. But light (more correctly, *light flux*) coming from a source may be considered to do so at a constant rate of speed. Therefore, for all practical photometric measurements, the element of time may be neglected, and light may be considered as a definite quantity.

The unit of this light flux or light quantity is the *lumen*. It may be defined

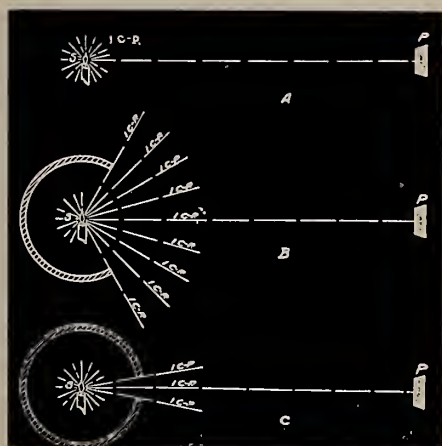


FIGURE 1

total amount of light produced by the illuminant.

Candlepower read in one direction is analogous to the depth of a pool of water

as the amount of light falling on a surface 1 square foot in area, every point of which is 1 foot from a uniform source of 1 candlepower.

If the opening indicated by ABCD, Fig. 3, is 1 square foot of the surface area of a sphere of 1-foot radius, the light escaping will be one lumen; if the area of this opening is doubled, it will be 2 lumens. Since the total surface area of a sphere with a 1-foot radius is 12.57 square feet, a uniform one-candlepower source of light emits a total of 12.57 lumens. Thus a light source of 100 mean spherical candlepower emits 1257 lumens.

Since an area of 1 square foot on the surface of a sphere of 1 foot radius subtends a unit solid angle at the center of the sphere, the lumen may also be defined as the amount of light emitted throughout a unit solid angle by a source whose average candlepower is 1 throughout the solid angle. From this point of view, candlepower may be considered as the number of lumens in a solid angle and is thus a measurement of the light density in a given direction.

Summarizing the foregoing definitions

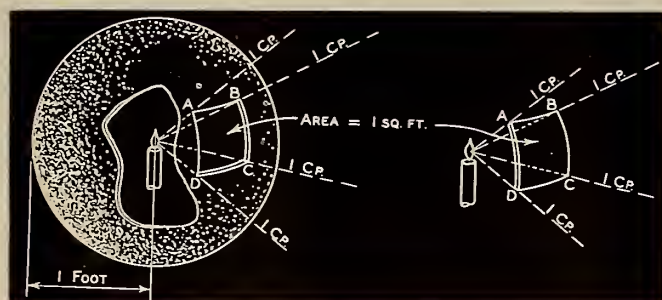


FIGURE 3

Relation of
candles to
lumens.

of candlepower and lumen, it will be seen that candlepower measures luminous intensity or light density of a light source in one direction only. It is no indication of quantity of light flux. The lumen, on the other hand, measures this quantity of light flux and does so irrespective of direction.

When the various candlepowers in any solid angle are averaged (which may be considered as *eliminating* direction), there is then a definite relationship of the candlepower to the lumens in that particular solid angle. This is expressed by the statement that a source of unit spherical candlepower gives 12.57 lumens.

TABLE A

Source	Foot-Candles
Moonlight	0.02
Well-lighted street (average)	1.0
Typical Interior	5-15
Daylight—	
At North Window	50-200
In Shade (outdoor)	100-1000
Direct Sunlight	5000-10000

Light may be termed the *cause*, and illumination the *effect* or result. Since candlepower and lumens are both a measure of the cause, they therefore apply only to the light source itself and not to the effect or result obtained. For the measurement of illumination, a unit known as the "foot-candle" is used in the United States.

A foot-candle represents the illumination at a point on a surface which is 1 foot distant from and perpendicular to the rays of a one candlepower light source. If the light source S in Fig. 4 has an intensity of 1 candlepower along the line SA, and if A is one foot distant from the source, the illumination on the plane CD at the point A is 1 foot-candle. The illumination at the points C or D will be somewhat less than 1 foot-candle, since the distance from the source is a little more than 1 foot and the light strikes at a slight angle.

The illumination at A is 1 foot-candle only if the plane is perpendicular to the light ray which strikes the surface at that point. If the surface is tilted so that the light strikes at some angle other than



FIG. 4. Illumination at A is 1 foot-candle.

This brings out an important relationship between lumen and foot-candle. A lumen is the light flux spread over 1 foot of area to a level of 1 foot-candle, or

$$1 \text{ foot-candle} = 1 \text{ lumen per sq. ft.}$$

This relation forms the basis of a simplified method of lighting design known as the "flux of light" or "lumen" method.

When the number of square feet to be lighted is known and the desired level of illumination decided upon, it is a simple matter to determine the number of lumens which must be provided on the working plane. For example, to illuminate 100 square feet to an average level of 5 foot-candles, 500 lumens would have to be distributed uniformly over this area. This may be expressed in the form of an equation:

$$\text{Area (sq. ft.)} \times \text{foot-candles (average)} = \text{total lumens}$$

Inverse Square Law

Another method of design known as the "point by point" method is based upon the well-known but widely misused inverse square law which also plays an important part in most photometric measurements. This law is illustrated in Fig. 5.

If the source of light is one candlepower, the illumination on a spherical surface 1 foot distant, as illustrated by A, is 1 foot-candle. If surface A is removed, the same amount of light passes to surface B, 2 feet away, and here covers 4 times the area of A. Since light travels in straight lines, and none of it is lost, the average level of illumination on B, 2 feet away, is $\frac{1}{4}$ as great as that on A, 1 foot away, or $\frac{1}{4}$ of a foot-candle.

If B is removed and the same amount of light falls on surface C, 3 feet away from the source, it will be spread over an area 9 times as great as it would be at A. The resulting illumination is therefore $\frac{1}{9}$ th of a foot-candle. At a distance of 5 feet, the illumination would only be $\frac{1}{25}$ th foot-candle.

Illumination decreases *not* in proportion to distance but in proportion to the *square* of the distance. This fact is referred to as the *inverse square law*. It should be emphasized that this law is based upon a point source of light from which the light rays diverge as shown in Fig. 5. Practically, it applies with

90°, there will be a corresponding decrease in illumination.

'Average' Illumination Values

A foot-candle reading applies only to the particular point where the measurement is made. By averaging the foot-candle at a number of points, the average illumination of any given surface can be obtained.

The foot-candle is the unit of measurement most intimately associated with everyday use of light. A working idea of this unit may be obtained by holding a lighted candle 1 foot distant from a newspaper. The result will be approximately 1 foot-candle of illumination. Table A, which lists the foot-candle levels experienced in everyday life, will serve as a basis for a better understanding of the various levels of illumination.

Referring again to Fig. 3-B, it will be seen that the surface ABCD fulfills the conditions for a surface illuminated to a level of 1 foot-candle. Every point of this square foot of a surface is perpendicular to the rays of a 1-candlepower source which is 1 foot away.

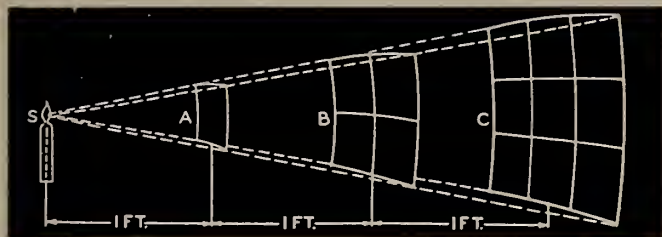


FIGURE 5

Illustrating the
inverse square law.

close approximation where the diameter of the light source is not greater than about 1/10th the distance to the illuminated surface.

It is obvious that if in Fig. 5 the light source, giving one candlepower in the direction of surface A, were replaced by a source of two candlepower, the illumination at A will become 2 foot-candles. Likewise, the illumination on B, if A were

There are two units of brightness in common use in this country at the present time: the *foot-lambert* and the *candle-per-square-inch*. The foot-lambert is the brightness of a surface which emits 1 lumen per square foot. One advantage of this unit is that the brightness of a diffuse reflecting surface, so expressed, is simply the illumination in foot-candles multiplied by the percentage of light which is reflected by the surface. Its use also simplifies the computation of the number of lumens necessary, to produce a certain brightness in architectural elements.

The candle-per-square-inch, equivalent to 452 foot-lamberts, is more commonly used to express the brightness of a light source or its enclosing globe. The brightness of the diffusing glass bowl of a study lamp, for example, must not exceed 3 candles per square inch if it is to meet the Illuminating Engineering Society specifications. Because of the fact that a bare lamp filament emits a large amount of light from a relatively small

area, its brightness may be several thousand candles per square inch.

Definition of Terms

It is important that the difference between illumination and brightness be kept constantly in mind. If a piece of white paper which reflects 80% of the light incident upon it, and a piece of gray paper which reflects only 40%, are placed side-by-side on a table top having a uniform illumination of, say, 5 foot-candles, both sheets will be illuminated to a level of 5 foot-candles, but the white paper will be twice as bright as the gray. It is this difference in brightness which accounts for the difference in appearance.

Difference in brightness, or contrast, is in fact the most important effect used by the eye to distinguish and identify objects. In reading ordinary print, for example, it is the difference in brightness between the black printed letters and the white background which makes it possible to identify the letters.

Table B lists the brightness of typical light sources in candlepower per square inch and should facilitate a better understanding of this unit of measure of brightness:

So far four units which should be thought of as forming the four cornerstones of illuminating engineering have been defined. These are listed in Table C.

[To be Continued]

Source	C.P. per Sq. Inch
Gas Flame	2.5
Enclosing Globe	2.5-4.0
White-Bowl Lamp	13
Frosted Lamp	50-60
Mazda C Lamp Filament..	6,000
Crater of Carbon Arc	100,000
High-Intensity Arc	400,000
The Sun	1,300,000

were removed, will be twice its former value; and similarly for B if C were removed.

To sum up, it is possible to formulate the general law that the illumination due to a point source is equal to the candlepower of that source in the direction of the surface divided by the square of the distance in feet from the source to the surface.

Units of Brightness

In defining illumination it is not necessary to specify the character of the surface being illuminated, since, as should be emphasized at this point, the character of the surface has nothing to do with the illumination. This depends upon the total amount of light which it receives.

Of this light, a part may be transmitted; the remainder is either reflected or absorbed. A surface which transmits or reflects light appears to be emitting light just as truly as a light source. It is by reason of light emitted that an object or surface appears bright.

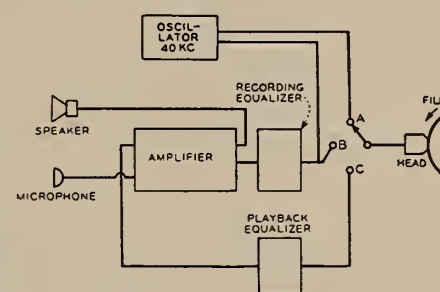
Magnetic Recording Now Ready for Standard Projectors

THE application of magnetic recording to all standard projectors—35-, 16-, and 8-mm—has been completed through further development work done at Armour Research Foundation of Illinois Institute of Technology by Marvin Camras, outstanding authority on the subject. Three projector manufacturers have been developing magnetic sound projectors for the past year and expect to have their units on the market within the next few months.

Movie Projector Application

The principles of the magnetic tape recorder were applied to movie projectors to produce magnetic sound on film. A narrow strip of magnetizable material is bonded onto the film between the sprocket holes and the edge of the film to serve as the tape or record. No additional drive mechanism is needed. An oil-damped flywheel smooths the flow of the film through the magnetic erase-record and playback heads housed just to the left of the flywheel.

With a plug-in microphone and the switch on "record" any sound—voice,



Electrical system used with 16-mm magneticall-recorded projection.

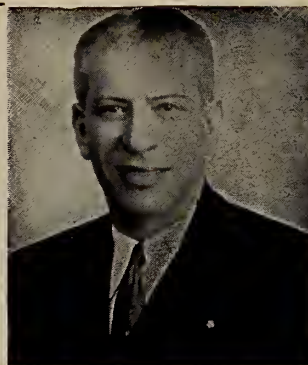
music, or sound effects—put into the microphone will be recorded on the sound track.

With the switch on "playback" the amplifier, built into the base of the projector, will take the sound off the film and play it back through a speaker which is either built into the projector base or placed strategically in the room.

Magnetic sound tracks are permanent and will outlast the film, with no appreciable loss in quality. They can be erased at any time, however, and a new track added simply by recording over the top of the old track.

Quantity Measured	Unit
Luminous Intensity	Candlepower
Luminous Flux	Lumen
Illumination	Foot-candle
Brightness	Foot-Lambert and Candles per sq. inch

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

IT IS our fervent hope that during 1950 every Local Union official—in fact, every individual member of a Local—will never relax the pressure on exhibitors to improve sanitary conditions in theaters. Existing conditions in a majority of theaters, regardless of locality, are a disgrace to the industry, a reflection upon those who presumably inspect such premises, and a challenge to Union officials.

Let us not forget that the projection room is the place where we spend a major portion of our lives, and that the sanitary conditions existing in such premises may have a terrifically important bearing upon just how long that tenure of life may be. Self-interest dictates our course of action. Everybody in on this—and keep pitching.

- In their first NLRB election, the television make-up artists and hair stylists employed at the NBC television station in New York City unanimously chose the newly organized Local 798, IATSE, as their collective bargaining agent. Contracts covering these workers are now being negotiated by Sal J. Scoppa, business representative for the Local, who is also organizing the make-up personnel of all other television studios in New York City.

- We are glad to report that F. P. (The Reel) McCoy, popular secretary of Local 444, New Kensington, Penna., and of the TMA Lodge there, has fully recovered from a virus infection which bedded him for several weeks.

- William A. Reed, 80, charter member of Atlantic City Local 310, was fatally burned in his home several weeks ago. Reed was one of the six original motion picture projectionists in this country, starting his life work back in 1896. He was also the first man to run a picture machine for an outdoor show, which was held in New Orleans 53 years ago. He was presented last March with a life gold membership card in Local 310.

- Too many of us are prone to forget our fellow workers once they depart this life. It was heartwarming, therefore, to learn of the fine gesture made by Local

364, Toledo, Ohio, in remembering at Christmastime the widow of Bill Elliott, former IA president who died last summer. The Local sent Mrs. Elliott a check for \$50 in remembrance of the many nice things Bill did for the IA membership while he was in office, a gesture that Local 364 members plan to repeat in the future. To John Shuff, business representative, and to the membership of Local 364, a salute for their thoughtfulness.

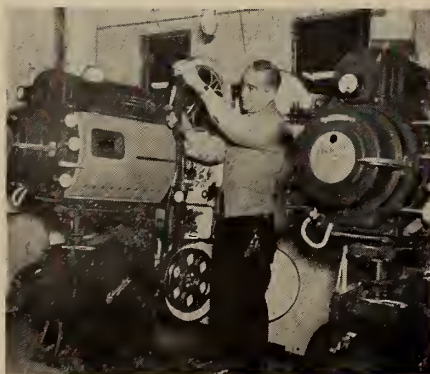
- For a good belly-laugh ask Dick Walsh, IA president, to tell you the story of the three preachers.

- There are many so-called "intimate" theaters, but we have heard of none that approaches for beauty in design, excellence of appointments and tip-top projection equipment the new Academia Theater, opened recently in Washington, D. C., by the Motion Picture Association, producer-distributor organization.

This theater, having only 71 seats, has a projection room 15 feet, 6 inches long; 10 feet wide, and 7 feet, 8 inches high. The room is soundproofed with Johns-Manville asbestos material, and has an asbestos tiled floor. Equipment includes two Simplex E-7 projectors, Simplex sound system, Peerless Magnarc lamps, Hertner Transverter, Super Snaplite lenses, Walker Screen, and GoldE automatic rewinder. The throw is 45 feet.

The regular full-time projectionist at

Projection boss of America's most unique theater: Frank Mitchell in the projection room of the 71-seat Academia Theater.



the Academia is Fred Mitchell, longtime member of Washington Local 224. His hours are from 10 a.m. to 6 p.m., five days weekly at top Class A theater scale; screenings at night or over the week-end call for overtime pay.

Incidentally, Mitchell has just developed a reel-end alarm which is attached to the outside of the upper magazine and does not touch the film. Of the governor type, the alarm works on centrifugal force.

- Al Johnstone, president of New Orleans Local 293 and IA representative, was one of the principal speakers at the 38th anniversary party tendered recently by Shreveport Local 222. From reports reaching this corner, we learned that Al was in top form that night—that is, oratorically speaking.

- The continued illness of his wife forced Sam Isaacson, for the past 20 years president of Baltimore Local 181, to resign from office in order to devote more time to help regain her health. Sam's resignation was regrettably accepted by the membership, who hope that Mrs. Isaacson's health will soon show definite signs of improvement and that Sam will once again resume his official duties.

- Pittsburgh Local 171 last month gave its annual Christmas party to the children of its members. Pictures of the previous year's holiday party were shown, in addition to a program of movie shorts and cartoons. Movies of the party were taken as Santa Claus, impersonated by one of the Local members, presented each youngster with a large package of assorted candies.

- Ben Hull, member of Local 186, Springfield, Mass., and Associate Commissioner of Labor and Industry in Massachusetts, has been endorsed by the Worcester CLU for re-appointment by Governor Dever. Ben has been active in the labor movement for many years, having served several terms as president of Local 186 and as an official of the State Federation of Labor.

- The recent death of Jay Mungovan, 61, member of Rochester Local 25,

ended a lifetime of service to unionism. Jay was associated with theaters in Rochester since the beginning of the century and was as well known in theatrical circles as is his brother Mike, business representative of Local 25. Many Rochester notables, in and out of the theater, attended the funeral services.

- One of our foreign correspondents, Jan Moolhuizen, Meentweg 79, Bussum, Holland, would like to correspond with projectionists in the United States and Canada. Moolhuizen is a projectionist in his own country and believes that an exchange of views on craft matters would be of mutual benefit.

- We are indebted to All Kuiper, R. Gretton, and H. Babb, members of Minneapolis Local 219, for an engaging bit of poetry which might be called "An Ode to a Strip of Film." These fellows are highly competent projection craftsmen, and their poetic endeavors are not to be dismissed lightly, either. However, as a result of some awkward, not to say painful, experiences, IP long ago was forced, practically in self defense, to impose an ironclad ban on the publication of poetry. We appreciate your thoughtfulness, boys, but you have no idea of the torrent of poetry that seemingly is induced by the whirring of a projector.

- Harvey Hill, Sr., business representative of Dallas Local 249, was presented with a gold life membership card in the Local in recognition of the fine service he has rendered the membership. Harvey is extremely popular with the members, who appreciate his steadfastness and sincerity.

- It is our sad task to report the death on Christmas morning of one of the finest personalities to ever grace this

LOCAL 150 MEMBERS INSPECT ARCHITECT'S DRAWING OF NEW CLUBHOUSE



Photo, Courtesy of Bert Vaughn, Los Angeles

Gathered about Magnus Neilsen (seated), business representative of Local 150, are (left to right): H. Clay Blanchette, board member; Paul J. Mahaney, ass't bus. rep.; Frank McBryde, board member; Hugh C. Smith, board member and pres. of Local 150 Club, Inc.; Earl C. Hamilton, pres. of Local 150; Clair C. Piper, board member; Kenneth Thampson, Sr., board member; M. J. Sands, vice-pres. of Local 150, and Charley Vencill, sec-treas. of both Local 150 and the Local 150 Club, Inc.

business—Edward W. LaVezzi, 71, founder and guiding light of LaVezzi Machine Works, of Chicago, manufacturers of precision projector parts. Mr. LaVezzi was stricken in November, and although he was subjected to major surgery, he never did regain his strength.

Mr. LaVezzi retired from active business affairs in 1940 and thereafter devoted his time to a small farm on the outskirts of Chicago. He is survived by his wife, five children, and nine grandchildren. His generous nature and kindly spirit will long be remembered by all who knew him.

- A decision in favor of Los Angeles Local 150 was handed down by a three-

man arbitration panel in the Local's dispute with the Fox West Coast circuit concerning the showing of "Forever Amber" at advanced admission prices. The Local contended that the advanced prices entitled the projectionists to first-run wage scales—a contention upheld by the arbitration board.

- Tom Canavan, brother of former IA president Bill Canavan, retired as Chief Barker for St. Louis Variety Tent No. 4 and has been appointed National Canvasman.

25 Years Ago—January 1925

- William Green succeeded the late Sam Gompers as president of the American Federation of Labor. . . . The first meeting of the newly created IA Board of Trustees—consisting of William J. Harrer, Local 8, Philadelphia, Penna.; William C. Scanlan, Local 73, Lynn, Mass.; and Clyde Weston, Local 147, E. St. Louis, Ill.—was scheduled for February 2, 1925 at the International headquarters. . . . L. C. Priddy, longtime business representative for Local 55, Roanoke, Va., was presented with a diamond-studded Elks emblem by the membership. . . . New York City Locals warned out-of-town IA men of the unemployment situation in this city and advised against their seeking work here. The Locals had too many of their own men on the unemployed lists. . . . IA men were urged to boycott the H. & M. trunks and baggage, used extensively by traveling attractions, because of the manufacturer's anti-union attitude.

- Of interest to the older members of the Alliance is the following partial list of officials who have served their Local

TEXAS NOT TO BE OUTDONE BY OTHER SECTIONS REGARDING UNION CLUBHOUSES



Ground-breaking ceremonies for the new business and clubhouse quarters of Local 279, Houston, Texas. First spadeful of earth was turned by Eddie Miller (center), business representative of the Local and also IA representative.

Unions for 25 years or more and who are still in office:

J. F. Mankin, L. 236, Birmingham, Ala.
George W. McGuire, L. 506, Anniston, Ala.
J. M. Stutts, L. 547, Florence, Ala.
James B. Perry, L. 169, Oakland, Calif.
T. Benjamin, L. 577, San Bernardino, Calif.
George H. Jones, L. 173, Toronto, Canada
A. B. Zumar, L. 257, Ottawa, Canada
Michael D. Frego, L. 345, Brockville, Canada
J. A. Whitebone, L. 440, St. Johns, Canada
F. B. Kipling, L. 523, Quebec, Canada
W. H. Hart, L. 47, Pueblo, Colo.
George A. Joseph, L. 284, Wilmington, Del.
E. L. Davenport, L. 41, Atlanta, Ga.
Ray McNickle, L. 288, E. St. Louis, Ill.
Frank Stickling, L. 483, Elgin, Ill.
C. W. Campbell, L. 133, Hammond, Ind.
Chas. H. Hartley, L. 539, Anderson, Ind.
E. L. Holem, L. 570, Michigan City, Ind.
Claude McElheny, L. 630, Peru, Ind.
Ben C. Miller, L. 67, Des Moines, Iowa
Chas. C. Johnston, L. 85, Davenport, Iowa
Earl G. Sowden, L. 385, Burlington, Iowa
P. E. Creston, L. 593, Creston, Iowa
C. C. Bretz, L. 498, Kansas City, Kans.
T. Schwaegerle, L. 17, Louisville, Ky.
A. T. Weiss, L. 293, New Orleans, La.
S. Wilson, L. 400, Alexandria, La.

There are many more to be added to this list—to appear in these columns next month.

IA ELECTIONS

LOCAL 150, LOS ANGELES, CALIF.

EARL HAMILTON, pres.; MORT SANDS, vice-pres.; CHARLES A. VENCILL, sec.-treas.; MAGNUS NIELSEN, bus. rep.; PAUL J. MAHONEY, ass't bus. rep.; THOMAS VEITH, sgt.-at-arms; H. CLAY BLANCHETT, FRANK MCBRYDE, C. C. PIPER, HUGH C. SMITH, LEO STOCKWELL, exec. board; C. C. BOLINGER, V. H. CROWELL, E. J. SCHMIDT, exam. board; H. C. BLANCHETT, E. HAMILTON, P. J. MAHONEY, M. NIELSEN, GEORGE J. SCHAFER, LEO STOCKWELL, C. A. VENCILL, del. IA Convention. Board of directors, Local 150 Club, Inc.: ALBERT R. ADAMS, H. C. BLANCHETT, E. C. HAMILTON, R. L. MACDONALD, F. MCBRYDE, P. J. MAHONEY, M. NIELSEN, C. C. PIPER, M. J. SANDS, H. C. SMITH, L. STOCKWELL, C. A. VENCILL.

LOCAL 171, PITTSBURGH, PENNA.

MARTIN TORREANO, pres.; LUTHER THOMPSON, vice-pres.; JAMES V. SIPE, sec.-treas.; WILLIAM H. THOMPSON, bus. rep.; DONALD ROSS, sgt.-at-arms; LOUIS INDO, GEORGE ENGSTLER, DAN FLASH, Sr., exec. board; B. E. LAUTH, CLYDE CAIN, WILLIAM MCELHATTAN, trustees; W. H. THOMPSON, L. THOMPSON, PAUL FERRY, L. INDO, del. IA Convention.

LOCAL 173, TORONTO, ONT., CANADA

J. STURCESS, pres.; HARRY JARMAIN, vice-pres.; GEORGE JONES, sec.-treas.; PAT TRAVERS, rec.-sec.; A. PURA, J. HILLS, E. SHIELDS, R. O'CONNOR, exec. board; E. WHYATT, J. STRINGER, D. CAMERON, trustees; J. STURCESS, S. WELLS, A. MILLIGAN, L. LODGE, del. IA Convention.

LOCAL 181, BALTIMORE, MD.

WILLIAM R. LANCE, Sr., pres.; CHARLES GRAULING, 1st vice-pres.; GEORGE MATTHEWS, 2nd vice-pres.; OTTO NIQUET, 3rd vice-pres.;

THOMAS P. FINN, Sr., fin.-sec.; WILBUR C. GEORGE, rec.-sec.; CARROLL G. BAYNE, bus. rep.; ELMER KASTNER, sgt.-at-arms; LOUIS SIEBER, GEORGE BREHM, WALTER FRINGER, trustees; SAMUEL ISAACSON, CARROL BAYNE, WILLIAM R. LANCE, Sr., THOMAS FINN, Sr., del. Baltimore Fed. of Labor.

LOCAL 224, WASHINGTON, D. C.

WILLIAM SHEEHAN, pres.; C. V. FRANKS, 1st vice-pres.; D. K. PETTUS, 2nd vice-pres.; T. D. BITTENBENDER, 3rd vice-pres.; M. M. BITTENBENDER, 4th vice-pres.; R. L. GRIMES, rec.-sec.; T. L. HOPKINS, fin.-sec.; C. W. FOWLER, treas.; C. C. FISCHER, bus. rep.; W. A. ROTH, trustee; E. E. FOWLER, guardian; R. M. WISE, guide.

LOCAL 257, OTTAWA, ONT., CANADA

J. P. MCGUIRE, pres.; A. B. ZUMAR, sec.-treas.; WILLIAM HARTNETT, bus. rep.; S. VENTURA, sgt.-at-arms; C. DAGENAIS, EDWARD FIELDS, D. RITCHIE, trustees.

LOCAL 302, CALGARY, CANADA

ART WISE, pres.; P. FILDER, vice-pres.; K. KREMER, bus. rep.; J. H. ELLIS, sec.; R. H. MCKAY, treas.

LOCAL 306, NEW YORK, N. Y.

HERMAN GELBER, pres.; HARRY STORIN, vice-pres.; ERNIE LANG, sec.; IZZY SCHWARTZ, fin.-sec.; ABE KESSLER, treas.; STEVE D'INZILLO, N. Y. bus. rep.; HARRY GARFMAN, Brooklyn bus. rep.; LOUIS J. ROMEO, sgt.-at-arms; AL ASHKINOS, HERMAN BORITZ, DICK CANCELLARE, CHARLES F. EICHORN, DAVE GARDEN, FRANK INCIARDI, AL KUNZE, ARTIE SILVERMAN, MIKE SPRINGER, EDDIE STEWART, exec. board; AL SPRUNG, BEN STERN, BARNEY WEINER, trustees; JOE ABRAMS, MIKE BERKOWITZ, SAM KIRSCHENBAUM, MORRIS I. KLAPHOLZ, DAVE NARCEY, WILLIAM SALKE, retirement board; S. D'INZILLO, H. GARFMAN, H. GELBER, F. INCIARDI, A. KUNZE, E. LANG, MAX ROSENBERG, TONY RUCINO, I. SCHWARTZ, H. STORIN, del. IA Convention.

LOCAL 376, SYRACUSE, N. Y.

LOUIS R. BOYD, pres.; MELVIN A. DENNY, vice-pres.; GEORGE RAAFLAUB, sec.; WALTER SCARFE, bus. rep.; JOHN KLOCK, sgt.-at-arms; LIONEL B. WILCOX, fin. sec.-treas.; LAWRENCE F. SHERMAN, HARRY C. BURLEY, exec. board; WARREN E. WILLIAMS, LEONARD TONDEUR, CHARLES R. NELSON, trustees; WILLIAM H. MAXON, del. Central Body.

LOCAL 407, SAN ANTONIO, TEXAS

GENARO G. GARCIA, pres.; DURWARD A. TAYLOR, vice-pres.; HENRY L. VILLAPADIARNA, sec.-treas.; HORACE E. BLANTON, rec.-sec.; JOHN D. DENNIS, bus. rep.; PHILLIP N. WEHRMANN, member at large, MANUEL AYALA, member at large.

LOCAL 521, LONG BEACH, CALIF.

MAX G. MILLER, pres.; VERNON G. MARTZ, vice-pres.; ALONZO S. BENNETT, sec.-treas.; G. A. LAHLUM, bus. rep.; PAUL KING, ELIOTT KIRBY, LEROY WARD, RALPH ADDY, M. MILLER, V. G. MARTZ, A. S. BENNETT, exec. board; MICHAEL PETRICH, C. E. LEYMAN, Jr., EVERETT COVINGTON, trustees; N. D. OWENS, R. ADDY, A. S. BENNETT, exam. board; PETER HELLER, sgt.-at-arms.

LOCAL 644 (Cameramen), NEW YORK, N. Y.

JAY RESCHER, pres.; GEORGE HINNERS, vice-pres.; HAROLD MULLER, sec.; SIDNEY

ZUCKER, treas.; WALTER A. LANG, bus. rep.; FRANK LANDI, sgt.-at-arms; EDCAR HATRICK, RICHARD W. MAEDLER, ULYATE K. WHIPPLE, trustees; LAWRENCE E. WILLIAMS, ALBERT MINGALONE, ROY EDWARDS, EDWARD HORTON, JACK HORTON, LEO ROSSI, THOMAS PRIESTLEY, FRANK ZUKER, CHARLES DOWNS, MORRIS HARTSBAND, JAMES FITZSIMMONS, HERBERT RICH, FRANK HURLEY, FRANK SERJACK, exec. board.

LOCAL 650, WESTCHESTER COUNTY, N. Y.

I. A. WEISS, pres.; ANTHONY DENTE, 1st vice-pres.; PATSY COLARUSSO, 2nd vice-pres.; ALBERT STORCH, 3rd vice-pres.; JOSEPH A. SCHAPPACH, fin.-sec.-treas.; MICHAEL J. NUGENT, rec.-corr. sec.; FRED THOME, bus. rep.; ALBERT E. BELL, DONATO DEPALO, trustees.

LOCAL 771 (Film Editors), NEW YORK, N. Y.

FRED AHRENS, pres.; MARC ASCH, vice-pres.; BOB DWORSKY, sec.; JOHN OXTON, treas.; CHARLES WOLFE, bus. rep.; LEONARD HEIN, BOB KLAEGER, JACK BUSH, trustees.

New Lubricant for High Pressures

A new, dry lubricant in the form of a molybdenum compound powder is said to be peculiarly adapted for extreme bearing pressure applications. It resists most acids, lubricating characteristics are not affected from the sub-zero range up to 750° F., and it adheres well to metal surfaces.

Plastic Cable Splice Housing

A plastic cable splice housing which eliminates outside wrapping operations, now used to join lengths of electrical cable, promises to reduce splicing time drastically. The housing is said to give a durable, watertight, electrical seal with either rubber or neoprene cable.

RCA REMOTE CONTROL TV CONSOLE



Barton Kreuzer, manager of RCA theatre and film recording activities, and Jack O'Brien, theatre equipment sales, describe console which, requiring at least 40 feet distance from TV projector, is scheduled to be installed in theater projection rooms.



LETTERS TO THE EDITOR

To the Editor of IP:

It seems that some of our boys are losing their eyesight, judging by the punch-marks and other markings used as changeover cues—yes, and this extends even to some new prints. Some of the screens in this area look like cancelled postage stamps.

Another annoyance here are the Penna. state censor strips which are not removed when prints are sent from Philadelphia exchanges into New Jersey. Here in New Jersey we run no censor seal, yet the exchanges will not eliminate the Penna. seal. It seems that they always have to place them between the end of the feature and the repeat cast following. Our only alternative is to remove these seals, or waste our time patching them on the very end of the print.

A good idea, I think, is for every projectionist to mark the first band of each feature with the actual running time. I do this on all my prints, and I feel that in this way we can help each other all along the line.

JOHN J. DWYER
Member, Local 359, Trenton, N. J.

Marking print footages is a good idea which will help the craft generally. Print mutilation is something else again, because the "butchers" will evidently always be with us and most exchanges are indifferent due, IP thinks, to the fact that exchange workers are vastly underpaid and grossly overworked. Concerted action by Southern New Jersey and other non-Penna. Local Unions served from Philadelphia exchanges might eliminate the censor seal nuisance, particularly on an "or else" basis.—Ed.

To the Editor of IP:

I was most interested in the symposium on cooling means for high-intensity arc projection which appeared in IP recently.* Considering the status of the contributors thereto, I was somewhat surprised at the conflict of views on the matter.

Some years back I worked in two theaters on the German water-cooled Ernemann V projectors. In both cases the projectors were connected to the main water supply through a regulating valve, and the merest trickle of water served to keep the gate and film really cool. The arcs pulled about 80 amperes.

Dual Cooling Setup

In addition to the water-cooled gate, the Ernemann V was fitted for air-cooling, and in the case of the latter the manufacturer utilized an interesting little plant. This consisted of a small compressor which blew the air through a water-filled vessel (somewhat like the Turkish Hookah pipe), thus delivering perfectly clean air to the gate

and also, by reason of the moisture in the air, helping to rehumidify the film. I never worked on this equipment myself, but I understand that it was quite efficient.

In my view, however, no air-cooling system can be so effective as a circulating water system, as the latter actually removes the heat from the projector and does not depend upon dissipating the heat into the atmosphere surrounding the projector.

While a water-cooled gate seems to be the answer to projector cooling, it does not completely solve the problem, as it still leaves open the question of the impact effect of the arc spot on the film, which in a really powerful arc is considerable. It would

seem that an optical heat filter of moderate power is needed.

The complete and simple answer would seem to be for all projectors to use water-jacketed gates, and all arc lamps to use heat-absorbing optical filters. Incidentally, the British-made Walturdaw V projector is fitted for both water- and air-cooling.

H. C. BROMLEY
London, England

Many IP readers other than Mr. Bromley were surprised at the sharply conflicting views expressed by the contributors to the aforementioned symposium. IP expressed its own opinion of the symposium's content in the Monthly Chat column for October. There is much food for thought by equipment manufacturers in Mr. Bromley's letter, if they can ever reconcile their opposing viewpoints.—Ed.

Sapphire Inserts to Reduce Projector Wear; IP's Views

SPECIAL sapphire inserts at points of concentrated wear are claimed to eliminate difficulties caused by uneven rates of wear on various parts of motion picture projectors, according to a statement by the Elgin National Watch Co., which developed these inserts for the DeVry Corp. of Chicago. The "wear parity" thus achieved, it is said, solves a series of problems common to almost all precision machines.

Other portions of the Elgin statement are appended hereto within quotes; and thereafter there appears an exposition of IP's views on this topic.

"Tests have shown the normal wear life of a projector to be increased approximately 400%. In addition, the sapphire inserts minimize film damage and produce outstanding increases in normal expected film life.

Greatly Reduced Wear Cited

"The sapphire is applied in two locations, the contact finger of the film shuttle and the film side guides in the film channel. The cam-activated shuttle engages the sprocket holes in the film to place a new frame before the projection aperture 24 times each second. Due to the highly abrasive nature of film, ordinary shuttles with contact fingers of hardened steel wear sufficiently to interfere with smooth operation and cause film damage in about 250 hours of running time. Sapphire shuttle contact fingers show no appreciable wear after 1200 hours of running, more than 100 million cycles.

"Film side guides of chromium plated steel, subjected to continual sawing action as they bear on the edge of the film under spring pressure, normally wear out in approximately 500 hours. Sapphire side guides continue to function effi-

ciently, showing no wear, after as much as 2000 hours.

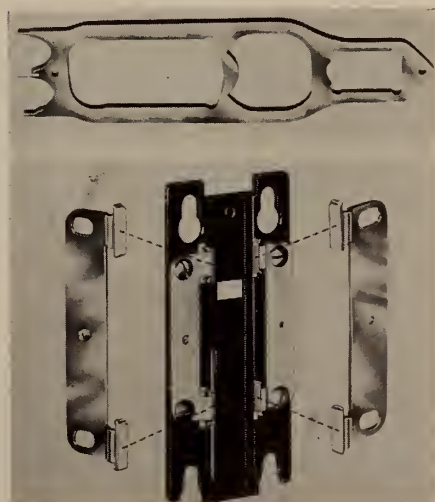
"As wear progresses on ordinary steel shuttles and film guides, the tendency to film damage is increased. A 'hook' worn into the shuttle contact finger tends to rip out sprocket holes and grooves side guides seize and rip the film. These film hazards are reduced by the sapphire inserts.

Among the properties of sapphire contributing to superior performance in this application are extreme resistance to wear and low friction values."

Commentary By IP

In the opinion of IP, the application of sapphire inserts, in places where hardened steel shows too much wear, may be necessary in certain projector designs. The parts shown are useful only on

Top: on the film shuttle the sapphire insert acts as the actual contact finger. Bottom: the film side guides against the film edges.



* "Cooling Means for H-I Arc Projection"; IP for September, 1949, p. 22.

16-mm projectors. The working hours mentioned for the sapphire reinforced parts are hardly comparable to requirements in 35-mm film practice.

Side guiding means employed now in professional projectors have practically unlimited life. Two thousand hours, as claimed for sapphire, represents just about 300 days of operation in average theaters. Furthermore, 35-mm film has a linear speed two and one-half times above 16-mm film, which factor will again reduce the life of the stationary side guides.

A high-speed movement of the claw type for 16-mm film may show too much wear on its film contacting surfaces. The substitution of hard steel by sapphire will, undoubtedly, reduce the wear on the pull-down finger. However, the film surfaces still will be subject to the same pressure and the wear may now be transferred from the finger to the film perforation.

The useful life of 1200 hours is still short when compared with the service life of a pull-down device using a sprocket-type film drive. Several years are not uncommon; whereas 1200 hours represents but 200 days.

'Television' Added to Official Title of the SMPE

Effective January 1, the name of the Society of Motion Picture Engineers was officially changed to the Society of Motion Picture and Television Engineers. Endorsed originally by the Board of Governors of the Society in June, 1949, and discussed at the business meeting during the SMPE Fall convention in Hollywood, the change of name was then submitted as a proposal to the entire voting membership by letter ballot in November. The count of ballots approved the change of name by an overwhelming majority.

Outstanding among the reasons for the change are the increasing mutual interests of technical people in both motion pictures and television, as well as the Society's active participation in the development of new television techniques.

In addition, the Society has filed a brief with the Federal Communications Commission proposing specifications for a nationwide theater television system. It feels, therefore, that the change of name coming at this time is simply a logical step forward.

Electronic Torch Cuts Fire Brick

Still in the laboratory stage is an electronic torch hot enough to cut holes in fire brick and to melt tungsten. Molecules of certain gases fed through a high-frequency arc are broken up into atoms, and the rejoining of these atoms on surfaces placed in the jet generates heat.

Presenting: Morris J. Rotker

BECAUSE of the nature of their work, projectionists usually find it difficult to engage in extensive community activities; yet there are those hardy and irrepressible craftsmen scattered throughout the country who not only do fine work at their trade but somehow manage to find time for off-the-job civic chores which in sum comprise an amazing expenditure of time and energy.

Outstanding in this respect is Morris J. Rotker, projectionist since 1907, a member of Local 306 for 35 years, and one of the better known citizens of the Bronx, N. Y. City, where he resides. Perhaps there was a portent of things to come in the fact that Morris was born in Warsaw, Poland, on July 4, 1892.

Morris' first job in the "movies" ensued as a result of fast talking that he was 18 years old, three more than his actual age. This was on the Bowery, in the heart of New York's Chinatown, and the job entailed not only "grinding" out film by hand but also operating a phonograph connected to a horn outside the store.

A Show on One's Back

In those days the exhibitor hired all elements of the show from the exchange, including the "operator." The latter, when reporting on the job, carried along with him the film, the projector, rheostats, posters and whatnot.

It wasn't really such a bad job—only

Multi-Functional Control



This installment of Simplex sound and visual projection equipment in the Ben Bolt Theater, Chillicothe, Ohio, shows that the volume control amplifier of the sound system is mounted on the side of the projector instead of the wall, as usual. The speaker control panel at the right, in addition to controlling all the usual functions—projector motors, house lights, curtain controls, etc.—also operates an illuminated display on each side of the proscenium opening.



MORRIS J.

ROTKER

from 10 a.m. to midnight seven days a week, *without a break for lunch or dinner*, for \$12 weekly. Morris was glad to have the job—and the \$12. Displaying even this early a penchant for advancing himself, Morris applied himself diligently, and at this writing he has been a licensed electrical contractor for more than 25 years, with several terms as President of the Bronx Electrical Contractors Association.

Many humorous stories anent the craft crowd the Rotker memory, of which the following is typical. A noted presentation house impresario of some 20 years ago commissioned an architect to build him the finest movie theater on Broadway—money no object. Plans were drawn (the theater was then a dream house—"a modern Eden") and construction went smoothly—until three days before the scheduled opening. It was then discovered that no provision had been made for a projection room!

The three nightmarish days following are well-remembered by the old-timers in the craft; but it will suffice to say that to this day this projection room still sits atop the roof, a section of which had to be ripped away in order to anchor the compartment. Also, in order to premiere, an ingenious periscope system had to be devised in order to even project the image on the screen.

Extensive Union Activities

Morris early took an active interest in the progress of Local 306, and the list of his Union activities is long and varied. He has been Chairman of the Examining Board, Secretary of the Local for many years, Chairman of the Legislative Committee, and as Chairman of the Health and Sanitation Committee he pioneered in obtaining many of the benefits the craft now enjoys nationwide.

Perhaps the most notable achievement by Rotker for his Union was when as Chairman of the Wage Scale Committee he succeeded in obtaining the first double-shift contract in New York, along

with the first two-year contract calling a 7½% wage tilt for the second year. Manager of the Claim Department, Organizer, Vice-President, and Acting President for a period of time are other Rotker activities in Local 306.

Standout War Record

Morris compiled an enviable record during World War II. He was Chairman of Civilian Defense in Bronx County, and as Zone Salvage Director he was cited for collecting, among many other scarce items needed for Uncle Sam, more nylon material than any other person in the country. This is quite apart from the fact that his two sons, enlisting as buck privates, emerged from the war as a Captain and a Lieutenant respectively.

Rotker also served on the War Production Board, the Volunteer Firemen, the Air Raid Wardens, and topped this off by selling more than \$500,000 worth of Defense Bonds. He was cited by the Red Cross for organizing blood donors. He was the only man appointed by the War Department as a recruiting officer for the WACs in New York, New Jersey and Pennsylvania.

On the fraternal side, apart from his Union, Morris is a Past Chancellor of the Knights of Pythias, for the past 11 years has been Treasurer of his Masonic Lodge, and has been Co-Chairman of the Federation of Polish Jews in America. He was one of the organizers of the 25-30 Club, Inc., of New York, being the man who obtained the organization's State charter. The first Vice-President of the Club, he was recently voted a life membership upon his retirement from a two-year term as President. Morris still is active in Local 306, in which his four brothers are also members.

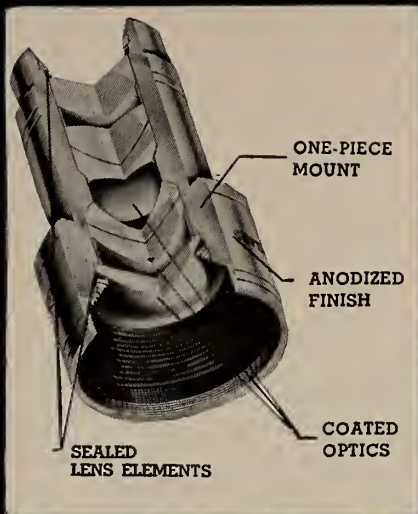
Borough School Board Member

A Vice-President and Captain of the Tackamuck Democratic Club of Bronx County, Morris was recently appointed to the Local School Board. Upon the occasion of handing out the diplomas to a graduating class of a high school recently, he commented humorously that he thought he would take a diploma for himself.

Is Morris still active in the craft? You bet: at the RKO Marble Hill Theater in the Bronx on a regular shift and where he has been for the past seven years.

There are many other activities and achievements by Rotker, but space limitations forbid their listing. Doting father, proud grandfather of three boys and two girls, Morris is a fine American citizen, a true friend to hundreds of people—and a credit to the craft. IP is happy to salute him.

f/1.9 SUPER-SNAPLITE



Question Box

NO. 11

ARE SNAPLITE LENSES SEALED?

All Snaplite Series II and Super-Snaplite lenses manufactured since January 1946 are of sealed construction to prevent entrance of moisture, dust or oil.

HOW ARE THEY SEALED?

This is accomplished by using a one-piece lens barrel made from a solid bar with no threaded joints. The front and rear lens elements are sealed by means of synthetic rubber gaskets.

SHOULD SEALED LENSES BE TAKEN APART?

No! Never disassemble a Snaplite Series II or Super-Snaplite lens. If any indication develops that the lens needs to be taken apart, it should be returned to the factory for complete examination.

WHY IS ALUMINUM USED FOR SNAPLITE LENS MOUNTS?

Because of its light weight, high strength aluminum alloy is preferred to brass for lens mounts, especially if it is protected by anodizing. Gold anodized finish is used for Super-Snaplites, while black was selected for Series I and Series II Snaplites.



ARE PLASTIC MOUNTS USED IN SNAPLITE LENSES?

Definitely not. The black anodized aluminum barrel has been mistaken for plastic, but we do not consider plastics as being suitable materials for mounting lenses of high precision.

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'Bargain' Film-Fire Misinformation

By RICHARD D. MARKS

NITRATE motion picture film is dangerously inflammable and produces copious volumes of poisonous, explosive gases when it burns. As long as a single reel of nitrate film remains in circulation, the nitrocellulose fire-hazard is of vital concern to projectionists.

It might be assumed that the textbooks prepared for the instruction of projectionists would contain a sufficiency of accurate information on the combustion of inflammable film and the causes thereof, but such is not the case with projection books so far published in any English-speaking country. The most widely accepted American textbooks, in particular, largely ignore the problems presented by the explosively combustible nature of nitrocellulose film.

Booby Prize Awarded

The booby prize for expositional reliability must be awarded, together with a bushel of scallions, to one Thomas O'Connor Sloane, Ph.D., LL.D., who, judging from the write-up accorded him in the Columbia (University) Encyclopedia, must have been a versatile cookie

in his heyday. The biographical puff reads as follows:

Sloane, Thomas O'Connor, 1851, American scientist, lecturer and writer on scientific subjects, and member of the editorial staff of the Scientific American, Science and Invention, and other periodicals. He is known for his inventions of various scientific instruments and his work in practical electricity. His publications include: The Electrician's Handy Book, Electricity Simplified, Standard Electrical Dictionary, Motion Picture Projection, and Liquid Air and Liquefaction of Gases.

The volume titled "Motion Picture Projection," published by Falk in 1922, is the book in which we are interested (having wasted precious hours in reading it), and which is hereinafter referred to as Doc Sloane's Comic Book.

This rib-tickling tome is, of course, not recommended to readers of IP except for the laughs it provides. It furnishes an abundance of these as well as outstanding examples of the abysmal misinformation purveyed by an academically alphabetized personage who is certainly no master of projection.

The following quotations from Doc Sloane's antiquated comic book would

not be worth printing were it not for the sad fact that projectionists are being "taken in" on a grand scale by certain second-hand theater supply horse-traders who are offering this outmoded and worthless percolation of esoteric projectionalia to the craft at 89 cents a copy (marked down from 90 cents). *The book is no bargain.*

Contradictions Unlimited

T. O'Connor Sloane, Ph.D., LL.D., is discussing the occurrence of film fire. "If something happens to stop the machine," declares the Doctor under the heading 'Danger of Fire Overestimated,' "and if the fire shutter fails to operate, and if the operator fails so utterly in presence of mind as not to force it down and to close the dowsers, the film will after a few seconds catch fire. The combustion is not very vivid. It is without much flame and not very rapid.

"There is no doubt that if the film ignited while the machine was in operation," he continues, "the fire might be carried down outside the limits of the aperture. Then it would spread and run along the film and get into the magazine at the bottom of the machine and make a disagreeable fire there.

"This would be bad for the mechanism of the head of the machine. But there

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would not be the least danger of a conflagration. The fireproof booth, and the very fact that the magazines are made of steel, acts to confine the effects of the most violent fire to two effects—one is to damage the machinery, and the other is to frighten the audience. The fire, it is fair to say, can do no harm to anyone. It is a misfortune as far as the delicate machinery is concerned, only; it can do no harm to any person."

The foregoing statement explains why T. O'Connor Sloane, Ph.D., LL.D., sounds off throughout the remainder of his learned discourse without a word of concern for the man who operates the projector and frightens the audience.

"The instant a machine stops working," our belettered misinformant glibly continues, "the operator should shut the dowser; the fire shutter, if it has not been neglected and allowed to become gummed up and sticky, will also shut; the film will burn, not so very fast over the exposed half-inch of area, and the first efforts of the operator after he has shut the dowser should be to light the room, so as to set the people at ease.

"But it is hard to know what to do with a crowd of people in a panic. It is a pity that our legislators have educated and trained the audience to be ready to rush for the doors, when a piece of film as big as one's thumb nail ignites and burns rather slowly.

Nonsense Unlimited

"The film is now so surrounded and framed in metal that if it does inflame, the center of the film alone will burn, a hole thus being made through the film, leaving the edges intact.

"As the only danger to be apprehended from a burning film is the panic of the audience, if the combustion can be restricted to less than a square inch of film, the vividness of whose combustion is restrained to some extent by the gelatine emulsion which carries the pictures on it, it would not seem adequate to frighten a theater full of people."

The foregoing, obviously translated from the original Kazikumukh, involves a serious contradiction. Were we not told that the only danger of a film fire is to the equipment and the audience, and that the house lights should be switched on—an unmistakable signal to the audience that a film fire has occurred?

"An operator will take the ground that a film will never do more than burn out in the center," declares the Doc with reference, apparently, to projectionists

who take the advice offered in his book. "This is a comforting idea, but it is better to contemplate the possibility of the whole film going off in half explosion, half combustion, and to take measures to make the ignition of the film as nearly as impossible as can be done."

'No Harm to Anyone'

Sensible advice, assuredly; but it seems that the Doc opened his mouth only to put his foot into it. Did he not tell us just a moment ago: "the combustion is not very vivid . . . it is without flame and not very rapid . . . not the least danger of a conflagration . . . the

fire can do no harm to anyone . . . it can do not harm to any person . . . burns rather slowly . . . if it does inflame, the center of the film alone will burn . . . the only danger is panic . . . ?"

Propriety and sheer exhaustion forbid further quotation from Doc Sloane's comic book, but readers with a taste for gobbledegook may obtain same for 89 cents at almost any junk shop. Either T. O'Connor Sloane knew all the answers except the right ones, or else he harbored a distinctly misanthropic grudge against the projection craft—and no bones about it.

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ADDENDUM:

To the Glossary of Tv Terms which appeared on page 26 of IP for December last should have been appended a credit line for *Tele-Tech*, outstanding journal in the electronic arts field. IP regrets this inadvertence.

NEWS PROJECTIONS

Jottings of happenings which, while mostly of a non-technical nature, have a bearing upon general industry welfare and progress.

PRESIDENT TRUMAN was rather coy (another expression for definitely non-committal) about the possible repeal of the 20% amusement tax, and

other excise taxes, in his first press conference of the year. Of course, had he come out flatfooted for repeal of such taxes, the Republicans automatically would oppose the program. This tax is lacerating show business, present-day admission prices being a far cry from the low prices which made the movies the greatest medium of mass entertainment the world has even known.

Average price for film tickets is up sharply from the low point established last July, but still is slightly lower than

comparable period last year, a survey shows. . . . This is *something*: In a move to trim operating expense, 28 theatres in Columbus, Ohio, closed the entire week preceding Dec. 24. Trailers announced that action was taken because "interest in moviegoing is at its lowest ebb during the week before Christmas." Nice (not) service by these theaters, nice ad for the business over-all, nice way to make people *forget* the movies.

Strangely enough, Wall Street prefers the new Paramount Theaters setup for investment as against the new production company. . . . *Important Note*: Fox West Coast Theaters have *abandoned* plans for installing theatre TV equipment in 12 of its theatres. Reason given was the "great expense" and, said Charley Skouras, prexy, "American people still want to go out for their entertainment." What the hell is this: isn't going to the theater "going out?" Real reason is that the toppers in this business, having got theirs, are a bit jittery and don't want to invest in any "courage" capital. Let the theaters go to pot. . . . Columbia Pictures reported a \$337,000 quarterly net profit, after taxes and all charges. . . . Not generally known, but RCA has long had on file in Wilmington, Del. Federal Court an infringement suit against DuMont on Tv patents. The old razzle-dazzle, with history ala sound pictures repeating itself—and the guy with the biggest bankroll and the largest patent department coming off best.

Charley Ross, recognizing the growing trend for Eastern production, notably in the N. Y. City area, is increasing his stock of lighting and other production equipment. Bad news for the West Coast boys, already hard hit by the British restrictions. . . . Reports an industry trade paper: the new Garutso balanced lens will eventually be adopted for 100% of movie production. The guy who wrote this item should read IP for December last, page 13. . . . Dept. of Justice demands that Griffith Circuit drop 93 of its 224 theaters in Oklahoma, Texas, and New Mexico within the next three years.

In areas where boxing is televised, attendance has hit an all-time low, according to the National Boxing Association. Who says Tv isn't deadly as an entertainment field competitor? . . . Among moviegoers with Tv sets, 37% prefer video as their favorite way to spend an evening, while 28% still vote for the movies, reports Audience Re-

Altec's 312 Theater Service Contracts

Altec Service Corp. has recently signed sound servicing contracts with 312 theaters in 42 states ranging from Maine to California. Thirty of these agreements related to drive-in situations.



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will be on ready call for quick emergency service.

Like the Service Plan for motion picture equipment, RCA's new Theatre TV Service includes periodic inspection calls and unlimited emergency service—at reasonable rates. Tubes and components are replaced without additional charge when Parts Plan is included.

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CAMDEN, NEW JERSEY

search. Among moviegoers *without* Tv sets, movies are favored by 34%, radio by 14%, Tv by 3%.

William A. Reed, charter member of Local 310, Atlantic City, and said to be the oldest living projectionist, burned to death at his home on Dec. 19. . . . "Squatting" on Tv channels was cracked down on by the FCC recently when it revoked the permit of the Raytheon Co. because of "excessive delay" in construction. . . . Distributors may put away the crying towels: domestic film rentals for 1949 were down only 1% from 1948 mark, which means a drop of only 10% from the all-time 1946 high.

Divorcement of Warner Theaters from producing company sees three important interest vieing for the setup, which Lehman Brothers, N. Y. bankers, having the inside track. . . . Hollywood in 1949 turned out a record number of films classified as the "family" type by the Protestant Film Council.

THEATER TELEVISION: WHAT, HOW AND WHEN

(Continued from page 14)

to a sponsor, but the promoter likewise may sell the theater rights to a co-operative group. The question tendered is whether it is economically feasible for the broadcast sponsor and the theater group to carry the same program.

If a boxing bout can be viewed on home receivers, there would be no need to attend a motion picture house which would carry the same program. On the other hand, the motion picture exhibitor could integrate the boxing bout into his scheduled evening show and thus offer an added attraction to his patrons. Whether the Tv broadcast of an athletic event would curtail the box-office returns of the theater Tv group, carrying the same sports program, cannot be answered

Theater Tv Educational Tie-in

A dramatic foretaste of the tremendous educational opportunities inherent in theater Tv was presented when the morning session of the General Assembly of the United Nations were presented instantaneously on the 15 x 20-foot Tv screen of the Fabian-Fox Theater for 4000 Brooklyn, N.Y., junior high school students. The event, representing the first use of theater Tv for educational purposes, made the 4100-seat Flatbush Avenue Theater temporarily the world's largest classroom.

The New York City Board of Education authorized release of the 4000 students from their regular classes to witness the historic program.

at this time. We have neither the data nor experience to buttress our conclusions.

Comparative Income Figures

But suppose 10,000 exhibitors were to band together and purchase *on an exclusive basis* the Tv rights to the World Series. The cost of such exclusive rights could be defrayed by an admission charge to view the World Series. In this connection, there are in excess of 19,000 theaters in the United States; their total seating capacity is close to 12 million; their monthly revenues are in excess of \$100 million; their yearly revenues produce a minimum revenue of \$1½ billion.

Compare these figures with an approxi-

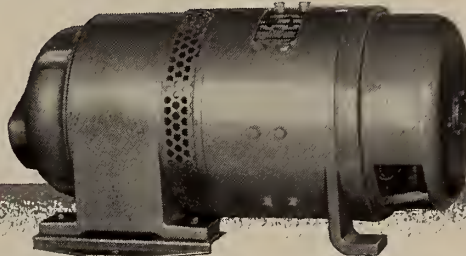
mate \$500 million yearly gross broadcast revenues. It is apparent that the Tv theater group could outbid the broadcast industry for the right to exhibit the World Series. Whether there will be competitive bidding between theater and broadcast Tv cannot be determined at this time.

Theater Tv does not exist on a local, let alone national, level. We do know that Tv broadcasting, particularly in the East, is one of the factors which has caused a diminution in the box-office returns of motion picture houses. It may well be that theater and broadcast Tv are non-competitive, but certainly the theaters must do something to offset

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their diminishing box-office returns. Theater Tv may be the answer.

Distribution via Film

A third source of programming for theater Tv is "live" acts. This term has reference to variety or vaudeville shows, concerts and plays. Theater Tv would enable all members of a co-operative group or theater chain in a city to furnish their patrons with vaudeville. Thus, a variety could be presented in a local neighborhood theater as well as in a "downtown showcase."

Since programs for theater Tv can be distributed *via* film, the latter gives flexi-

bility to the program schedule of a motion picture house engaged in theater Tv. The financial resources of the theater Tv group on a national scale suggest that it could sponsor a repertory company which would produce different plays each week. An exhibitor could charge an increased admission fee for exhibiting such a play.

The recording of such plays on film would enable the theaters to exhibit the play or plays at a time or times convenient to its patrons. Theater Tv is available to enlarge the concert audience. Thus, a concert by a distinguished

pianist could be made available in motion picture houses. Undoubtedly, financial arrangements could be effected among the promoter, the artist, and the exhibitor.

Theater Tv likewise may be employed as a new means for the distribution of film. Thus, a feature-length attraction could be distributed on a national, regional, or local basis to exhibitors. The electronic method of distributing motion picture film could furnish the producer with an efficient method of "trade-showing" film; it could reduce the number of positive prints, and thus costs.

Theater Tv may conceivably result in far-reaching changes in the trade practices of the motion picture industry and effect substantial economies in the distribution of film.

Theater Tv is not limited to entertainment: it can render a public service to the community. Thus, in the forenoon, the theater Tv system in its entirety could be made available to the school system. The latter could install receivers in the schools; also, it could use the theaters as classrooms. Lectures and motion pictures could be made available to the entire student body of a community.

Educational Tie-in

It has been suggested that theater Tv might be the medium or means whereby the schools can use Tv without undertaking the costly job of constructing and operating a Tv broadcast station. This discussion indicates that theater Tv is technically and economically feasible, that there are adequate sources of program material which can and will be made available to the theater Tv group. Theater Tv will stimulate and help the box-office returns of the motion picture exhibitor.

Theater Tv, which is non-existent today, constitutes no economic threat to Tv broadcasting. But if theater Tv is organized on a local, regional, and national basis, it could become a challenge to Tv broadcasting.

Whether theater Tv ever will achieve its potentialities as an entertainment and public-service medium depends on the willingness and determination of the motion picture industry to develop this new art. Failure to accept this opportunity may well spell the doom of theater Tv, since the motion picture industry has the resources and can adapt its technical knowledge to this new art. The time to act is now.



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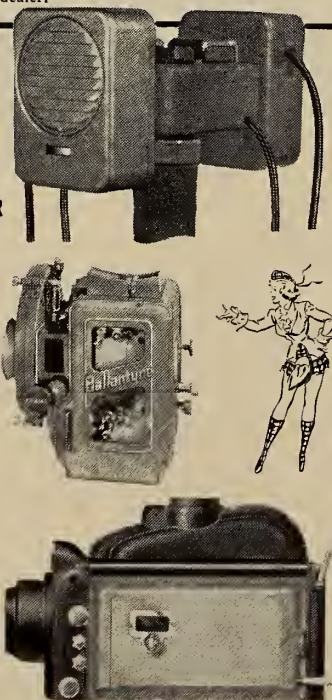
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MONTHLY CHAT

(Continued from page 3)

quarters that they had adopted round, in preference to square, screen corners. . . . A delegation of IA officials was received by President Truman, who was told that the studio labor situation was acute, with 40% of the workers idle. The President promised his support in easing British restrictions on American-made movies. . . . Cy Dash, president of Hertner Electric Co. and widely known generator expert, retired after 30 years service. He was succeeded by H. P. Niemann. . . . Two new items were announced by Wenzel Projector Co. of Chicago: a soundhead and a projector base. . . . April 23 marked the 53rd anniversary of the first showing of a motion picture in a theater—at Koster & Bial's Music Hall in downtown N. Y.

MAY: John L. Lewis took a shellacking when his catch-all District 50 was licked by the IA in a collective bargaining election anent theater service workers in Philadelphia. . . . Eastman's new safety film had attained a level of one-sixth of all release prints in use in the U. S., the prediction being that it would reach the one-quarter level by Sept. 1. . . . National Broadcasting Co. advised the Theatre Owners of America of its readiness to produce special theatre Tv. Named to the SMPE Board of Governors was the first

all-out Tv man, William Lodge, v-p of Columbia Broadcasting.

JUNE: RCA announced the use of nylon gears for its "400" 16-mm projector. . . . A survey of audio engineers came up with the opinion that aural acuity is steadily diminishing as a result of mass listening to radios and phonographs of doubtful quality. (This could be a blessing on some occasions—Ed.)

A projectionist inquired of IP where he could obtain an arc aligning rod, appeals to several dealers having been fruitless—if you can imagine that sort of thing in 1949! . . . Two New York theaters (Paramount, Times Square, and the Fox, Brooklyn), presented large-screen pictures of the Walcott-Charles fight, via *direct* Tv pickup. The latter theater was SRO; at the Paramount business was so-so.

JULY: The Monthly Chat column contained some sharp but true comments anent the various methods being employed for cooling projection equipment, thus precipitating much agitation among various manufacturers, of which more anon. . . . IP presented an analysis of the status of the cadmium-mercury vapor lamp, with special emphasis upon its relation to the carbon arc. . . . Two old-line IA officials passed away: Bill Elliott, former IA President, and, Louis Krouse, who served in many capacities and retired as General Secretary-Treasurer.

Century Projector Corp. announced a water-cooled projector gate. . . . J. E. McAuley introduced two new adjustable arc stabilizing magnets for the Hy-Can-descent and the Magnarc lamps. . . .

Larry Davee, of Century Projector, named chairman of the SMPE Projection Practice Committee. . . . Death claimed two manufacturing company executives known to thousands of projectionists: I. L. Nixon of Bausch & Lomb, and J. H. Kurlander, of Westinghouse Lamp Co. . . . There were 19,323 theaters operating in the U. S.

AUGUST: SMPE Progress Committee re-

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port revealed a tremendous upsurge in the use of magentic recording and reproduction. . . . Moviegoers everywhere were squawking loud and long about the practice of showing reissues without so identifying them. . . . Century unveiled a new sound system which reflected important advances in design, operation.

SEPTEMBER: The SMPE petitioned the FCC for 60 channels for theater Tv. . . . RCA announced an all-electronic system for transmitting color Tv, with existing receivers requiring only an adapter to handle the images. . . . By a membership vote of 54 to 51, the IA retained supervision over Local 244, Newark, N. J. . . . IP presented a full-dress symposium on cooling means for high-intensity projection, the participants being the leading equipment manufacturers in the field. Projectionists generally were amazed at the conflict of opinion on

the topic which, it seems, could readily be resolved by a little testing in the factory or laboratory. The symposium did serve, however, to focus industry-wide attention upon this pressing problem.

Altec-Lansing announced its entry into the quality Tv receiver field, on a custom-made basis. . . . TESMA-TEDA staged a convention and equipment show at Chicago which attracted 3000 attendance and offered 87 different exhibits in 110 booths. . . . DuPont introduced a new release positive film in which the usual gelatin is replaced by a superior synthetic polymer.

OCTOBER: Western Union demonstrated an improved version of its concentrated-arc light (zirconium). No claim was advanced that this light source is as yet ready to challenge the carbon arc. . . . Emil J. Weinke, chief engineer for Motiograph, died. . . . DeVry Corp. disclosed its new "Koolite" system of air-cooling for projector aperture area. . . . Strong Electric Corp. took the wraps off its new "Mighty 90" high-intensity arc lamp. This unit, rated at 75-125 amperes, uses a 16½-inch, F:1.9 reflector and is said to deliver 21,000 lumens.

Showing of large-screen pictures of the World's Series games via direct pickup was marked by spotty business

in six theatres east of the Mississippi. . . . Altec-Lansing took over the commercial activities of Western Electric in microphones, speakers and disc recording equipment. . . . Pleas of major broadcasters for FCC approval of color Tv fell on deaf ears. FCC blasted vacillating tactics of petitioners, opining that color Tv has been in the process for 20 years but just never seems to prove itself.

NOVEMBER: In one of the most important decisions affecting Labor Unions ever rendered, the California Supreme Court ruled unanimously that jobs and membership in a Union were not vested in an *individual* but in the *organization*. The case arose when two out-of-town members working in the jurisdiction of San Francisco Local 162 sued for full membership therein. The petitioners won in the lower court; but the higher court, referring frequently to the provisions of both the International and Local Union constitutions and by-laws, held it unquestionable that the right of acceptance or rejection of an applicant was vested in the Union. IP printed this decision verbatim (Dec., 1949, issue).

DECEMBER: IP presented exclusively full technical data relative to National Carbon Co.'s new 13.6-mm "Hitex" carbon. Rated at 170-180 amperes, this carbon out-performs any similar carbon ever made by National. . . . Lens manufacturers announced the availability of new long focal length lenses from 5 through 7 inches, with a speed of F:1.9. Practically all projector manufacturers started that they were now ready to accommodate this 4-inch diameter lenses.

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(Continued from page 6)

positive and negative films move uniformly past a slit-aperture through which the printing light is directed. The step printer, however, resembles a camera or projector in having an intermittent movement (Geneva or claw) and an occulting shutter. This type of printer therefore prints the positive in one-frame "steps."

The picture images and the soundtrack are printed in two separate operations, there being a separate negative for these two parts of the complete film image. The frames marked PICTURE and

SOUND sometimes found on the leaders of prints are printed through from the identification leaders of these two negatives. Synchronization of picture and sound is assured by the correct placing of "printer's start" markings when threading the printing machines.

Many continuous printers are provided with separate light-slit masks so that both picture and sound may be printed in two operations on the same machine. Other printers have two light-slits and print both picture and sound in one operation. It should be noted that sound negatives must be continuously-printed without exception, hence laboratories employing step printers for pictures must have continuous printers for the soundtracks. The two types of machines are often combined to cut in half the number of required operations.

The continuous printer is considered superior to the step printer for run-of-the-mill work. It can be operated at a higher speed, the results obtained are more uniform, and it is mechanically less complicated. Moreover, curved light-gates may be used with it to compensate for negative shrinkage.

The step printer is thought to give better results with badly shrunken negatives, however. But attempts to increase the output of obsolete step printers often results in an unsteady picture being printed on the film. Many times the projectionist has been blamed for swaying and jumping pictures when the fault lay with the laboratories not adequately equipped to handle the volume of work they have undertaken.

Step printers having "stop shutters" and separate intermittent movements for negative and positive are necessary for "trick" printing—the arrest or reversing of motion, the speeding-up of action by omitting every other frame, etc.

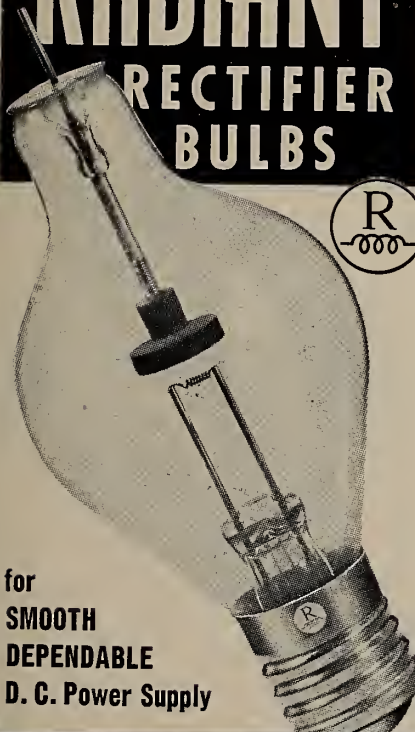
Setting Print Density

All printers are equipped with means whereby the intensity of the printing light may be changed at will, even while the printing operation is in progress. The necessity for "change lights" can readily be appreciated.

Because the developing process is

uniform and standardized, the intensity of the printing light is the only point of control over the density of the finished print. The average reel of picture negative consists of an assemblage of several scenes taken with different cameras and under diverse conditions of exposure. In order to obtain pleasing image densities throughout the entire length of a print, it is often necessary to vary the printing light several times during the printing of a reel.

Printing-light changes are indicated by notches cut into the edge of the negative



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film. These notches either operate automatic light-changing devices built into the printer, or else operate a bell which informs the operator of required light changes. The trend is toward fully automatic change lights.

The light source of a film printer is an incandescent lamp which is focused on the light-slit or aperture by a precision optical condensing system. Absolute uniformity of the light field is essential. The intensity of the light is varied by mechanical means to avoid the color changes which would be produced by varying the filament voltage. A special form of automatic voltage regulation is utilized to insure against voltage changes greater than 0.25 volt from standard.

Handling of Negative Film

Film laboratories handle negatives with great care. After every 10 prints or so, the negatives are returned to the polish room to be gently brushed free of dust and polished. Despite the great cleanli-

ness of the air circulated in the printing room, the pickup of dust particles by the negatives seems unavoidable. Much of this dust is believed by the laboratory manager of one of the large Hollywood studios to come from the positive raw stock. The dust particles adhere to the negatives by means of electrostatic action.

A few laboratories further reduce the risk of damage to negatives by "heads-and-feet" printing. This method eliminates the need of rewinding the negatives by making each alternate print with the negative running in the wrong direction. When heads-and-feet printing is employed, "printer's start" markings and identification leaders are attached to both ends of the negatives.

There is always the possibility that a negative may become damaged or lost, of course. To safeguard the production, an investment of perhaps millions of dollars, a "protection print" is made from which a duplicate negative ("dupe") can be printed if an accident befalls the original negative. A protection print is quite the same as any print, except that it is sometimes made on lavender-tinted stock.

The duplicate negative obtained from printing the protection print on positive stock has a quality of about 87% that of the original negative. (Approximately 7% of the picture and sound quality is lost through one printing.) A positive printed from a carefully made dupe therefore has approximately 87% of the quality of a positive made directly from the original negative.

The Developing Process

In the days of silent movies, motion picture film was frequently developed by hand. The exposed film was wound on huge drum-like racks which were pivoted so that they could be rotated, and supported in such a way that they could be quickly moved to the tanks of developer, rinse, and fixer. Only the lower part of the rack dipped into the tank over which it was suspended. The rack was turned by hand in order to

bring all of the film in contact with the liquid.

The degree of development was judged by inspection of the film under red light. The contrast values and general pictorial excellence of the picture were under the direct control of the processing technician. Developing was more of an art than an exact science; and considering that the final result depended solely upon visual judgment, the results were really beautiful. As a rule, the contrast values of the original subject were somewhat exaggerated in the finished print.

The introduction of the soundfilm upset laboratory technique entirely. Scientific control of all processes was mandatory, for soundtrack and picture are carried on the same positive film, and a print which looked good might give intolerably bad sound reproduction. Hand developing gave way to machine processing, as only the latter permits a satisfactorily close control of contrast-factor, or *gamma*.

'Gamma' and Its Effect

Gamma expresses the contrast-factor of a photographic film image—picture or soundtrack—in terms of the logarithm of the relative exposure. Although gamma is primarily a characteristic of

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the emulsion, it may be varied within rather wide limits by the time of development and by the type of developing agent used.

A gamma of 1 is arbitrarily set as the normal contrast-factor of a photographic image. An image having a gamma less than 1 may be rich in detail, but lacking in normal contrast range. Such an image has a flat, "washed-out" appearance. But when an image has a gamma greater than 1, contrasts are exaggerated, and delicate detail in the highlights and shadows of the image may be utterly lost.

If a negative is developed to a gamma of 1, it is necessary to develop the positive print to a gamma of 1 in order to obtain an overall, or resultant, gamma of 1.

Soundtrack negative is ordinarily developed to a gamma of about 0.50 in order to avoid distortion from photographic causes. In order to obtain an overall gamma of 1 in the print, the soundtrack positive must be developed to a gamma of 2.00:

$$0.50 \times 2.00 = 1.00$$

Certain electrical losses in the recording amplifiers, however, have the same result as reduced contrast of the soundtrack image. In order to overcome these losses, a positive gamma of about 2.15 is required. This gives an overall soundtrack gamma of:

$$0.50 \times 2.15 = 1.075$$

or, roughly, 1.08, which is considered satisfactory.

The picture image poses a somewhat similar problem. A slight exaggeration of pictorial contrast is an artistic advantage, and it also counteracts a loss of picture contrast inherent in projection. So instead of being developed to a gamma of 0.50 like the sound negative, the picture negative is developed to a gamma of about 0.65. Whenever the positive is developed to a gamma of 2.15, the picture has an overall gamma of:

$$0.65 \times 2.15 = 1.3975$$

or, approximately, 1.40. Precise gamma control is admittedly a far cry from guesswork and personal taste in the matter of developing motion picture prints, but frankly, it cannot be said that the present-day picture images are more beautiful than those which graced the silent screen.

Film-Developing Machine

A film-developing machine is a formidably complicated affair. The main part of it is made up of a series of large tanks containing the various solutions through which the film is conducted in succession by a bewildering array of rollers and sprockets.

The leader of blank film used for

threading up the developing machine is approximately 2000 feet in length! As the machine is run continuously for many hours at a time, each roll of film to be developed is spliced to the end of the one preceding it while operations are in progress. A virtual reservoir of film upon which the machine can draw during the time needed to make the splices is provided by a film "elevator" at the film-feeding end of the machine. It would, of course, be ruinous to the film to stop, or even to retard a developing machine while film is being processed.

The film first enters the developing bath. The time of development is regulated by the threading of the flanged rollers which carry the film through the bath in a number of vertical loops. If a comparatively short developing time is required, the film is threaded to by-

pass certain of the rollers, thereby decreasing the number of loops immersed in the solution and the time at which any one part of the film remains in contact with the liquid.

After leaving the developing bath, the film passes through a rinse of pure water, and from that to the fixing bath. This is followed by one or more tanks in which the film is washed and, in some cases, chemically-treated to harden the emulsion and hasten drying. The final washing removes traces of processing chemicals which, if permitted to remain in the emulsion, would cause serious stains.

Final Developing Stages

After passing from the last tank, the film is drawn into a battery of tall, glass-doored drying chambers. In these compartments the film passes over top and

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bottom rollers to form many hundreds of long loops which bring the emulsion into effective contact with the current of warm, dust-free air which is continuously supplied to the chambers by special air-conditioning equipment.

From the drying cabinets the film goes to a takeup assembly at the end of the machine to be wound up on 1000-foot reels.

The swelling and shrinkage characteristics of film stock are important considerations in machine developing. The older types of safety film (cellulose diacetate and acetopropionate) underwent considerable swelling, or longitudinal expansion, when wet, causing the film to slack off the bottom rollers in the processing tanks, and it shrank very rapidly when drying out, resulting in excessive tension and distortion of the film in the drying cabinets. The newer high-acetyl safety film swells only a little more than nitrate film by absorption of water. Moreover, the rate of shrinkage of high-acetyl film is comparatively slow, eliminating undue tension and straining of the film during the final stages of drying.

The greatest care is taken in the preparation of the processing chemical solutions. A single mistake in mixing these might easily result in spoiling hundreds of dollars' worth of positive raw stock or, worse, long lengths of precious negative.

In large laboratories, solutions are mixed in tanks built just for this purpose, and are transferred to the tanks of the developing machines by pumps. The developer is frequently tested with sensitometric control strips (frequently inserted in the leaders of the film stock¹) and corrected if any departure from standard strength is noted.

It is customary to mix fresh developer every day for both negative and positive processing. Hypo (fixer) is mixed fresh daily for negatives, but is often used two days in succession for positives, the dissolved silver being removed from it electrolytically and more sodium thiosulfate added to maintain constant strength. The recovery of silver from spent fixing baths is a source of con-

¹ The placement of densitometric strips in the leader negatives for the purpose of checking the development of prints is understandably a desirable practice. But the projectionist is grossly imposed upon whenever such strips are inserted in the main portion of SRP threading-up leaders.

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siderable revenue to film laboratories.

Certain photochemical troubles are sometimes encountered in the developing process, particularly in the development of the more rapid panchromatic negative stocks. One of these is a "halo" effect produced at the edges of dark objects in the negative image. This is due to the release of bromine from the reduced areas. In some instances the bromine is carried along by the film to produce streaks which may be either light or dark, and resembling "travel-ghost" when light.

Another difficulty is the production of a 96-cycle hum in the sound by droplets of developer adhering to the sprocket holes of the film and spreading into the soundtrack. This trouble, discussed exhaustively in a number of technical papers, has now been largely overcome.

Preparing the Release Print

The 1000-foot reels of processed and dried film are sent to the inspection room, where each reel is projection-tested. Defects are indicated by paper slips placed on the film in the takeup magazine of the projector while it is running—a procedure familiar to all projectionists—and the defective portions are later replaced with reprints.

The prints are then ready to receive "lubrication" in the film-waxing room. The purpose of this treatment is to minimize damage caused by the "sticking" of new prints during the first few projections with high-amperage carbon arcs.

Even though dry to the touch, the

emulsion of a "green" print contains a considerable amount of moisture, the presence of which makes the emulsion soft and amenable to damage. The intense heat of the projector gate further softens the emulsion, causing it to rub off and accumulate on gate runners, where it forms hard deposits which result in a variable "drag" on the intermittently-moving film. At one moment the holdback is so great that the film perforations are torn; and the next moment the film "lets go" and overshoots on the intermittent sprocket.

"Sticking" is evidenced by a violent chattering of the film, and, when severe, in an excessively jumpy picture on the screen.

In the standard method of film lubrication, a thin coating of carnauba wax is applied to the perforation margins on the emulsion side of the film. In another method, a very dilute solution of carnauba or similar wax in carbon tetrachloride is applied all over the emulsion side, and a radically different (and more expensive) process coats the emulsion with a thin layer of nitrocellulose lacquer.

The finished reels—still of the standard laboratory length of 1000 feet—are packed in tins, (the same cans in which the raw stock came) and released to the exchanges, where reels of the longer film subjects are "doubled up" and wound on 2000-foot shipping reels for distribution to the theaters.

[To be Continued]

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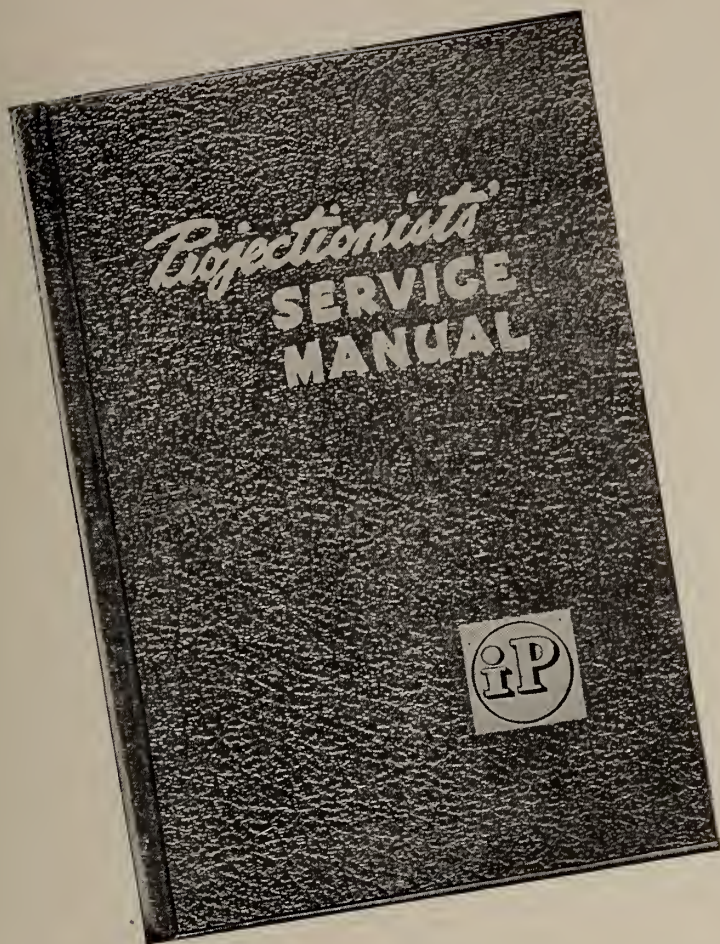
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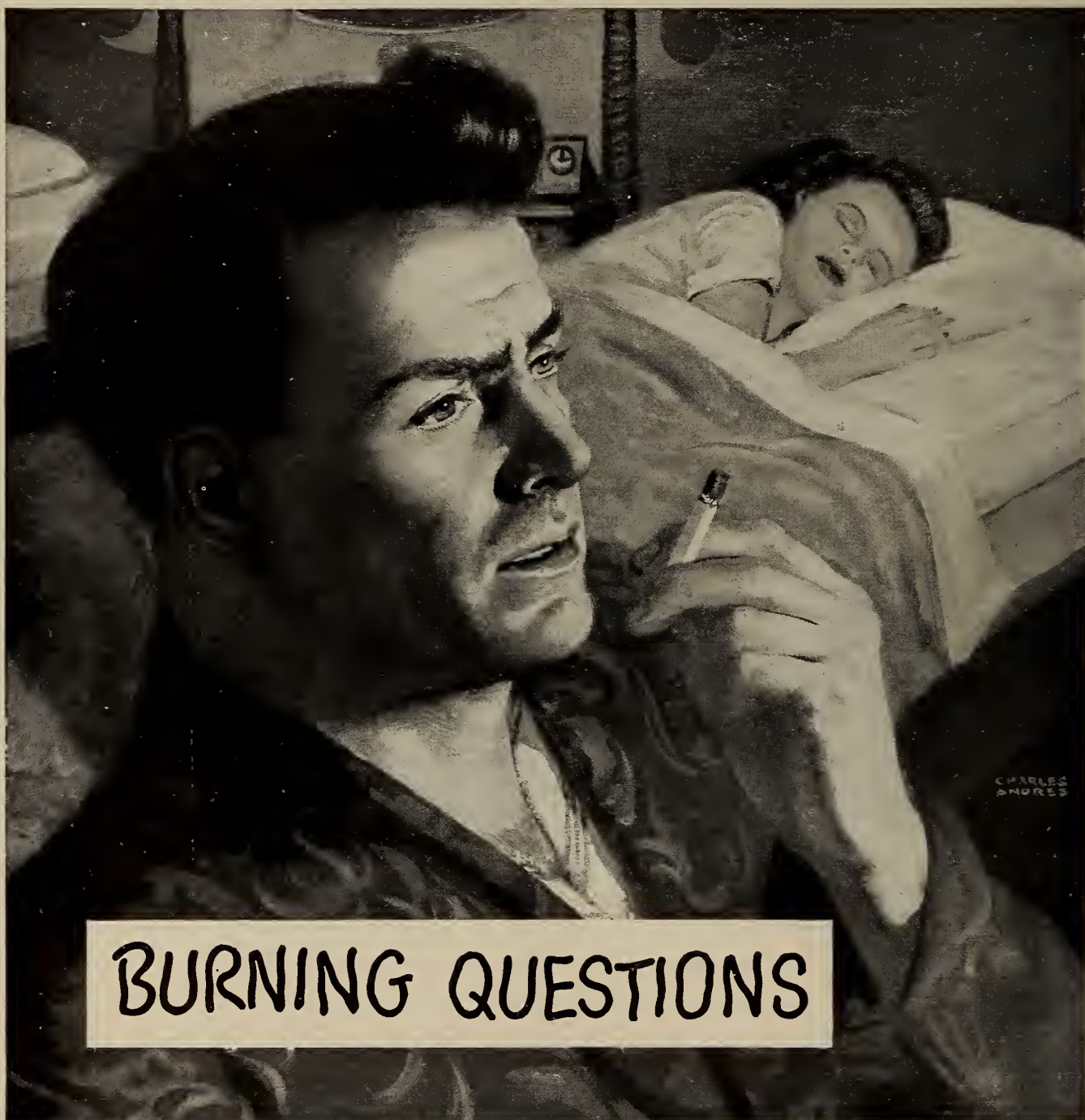
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HENRY B. SELLWOOD, *Editor*

Volume 25

FEBRUARY 1950

Number 2

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MONTHLY CHAT

THE slumbering bear has at last awakened from his years' long hibernation to find that the gnawing at his now lean hide is the work of that which, a gnat when he settled into somnolence, has now grown to the proportions of a vulture. The bear in this metaphoric sentence is the motion picture theater field; the gnat, now the vulture, television.

Some there are who will regard the article by M. D. Boatright on page 11 of this issue as pure fantasy, as “scare copy.” But infinitely more “scary” are the almost daily stories appearing in the trade and lay press of the rapidly developing love affair between the Hollywood producers, the source of product for theaters, and the Tv broadcasters, no less than the results of impartial—and we mean *impartial*—surveys of audience preference which indicate that the Tv industry, even in its present state of undernourishment due to lack of sufficient channels to blanket the country and the scarcity of receiving sets, is rapidly sapping the lifeblood of the movie theater.

Mr. Boatright's theme is simplicity itself: no audience, no theater; no theater, no projectionists.

Could this situation develop in the near future? Well, let's consider the results of a survey conducted *not* by any pro-Tv group or even by any so-called impartial investigative body, but by the theater owners of Washington, D. C., among 400 owners of Tv sets. This survey showed that the installation of a Tv set in a home effected a 72% slash in movie theater attendance among adults and a 46% cut among juveniles! Just translate those percentages into the reduced number of dollars available to pay theater salaries.

In the light of these figures the concentrated dullness and myopic vision of movie exhibitors in refusing to lift a hand to help themselves is beyond belief. Easily understood, however, is the attitude of Hollywood producers who, in making come true every prophecy IP made on this movie theater-Tv imbroglio, maintain that when better pictures are made they will make them—for Tv!

Movie theater participation in the benefits accruing from Tv broadcasting is entirely feasible: there are several methods by which theaters could maintain their identity as a community gathering place, as in years past, and still serve that portion of their audience which preferred to see the program in their own homes. Mr. Boatright mentions only one of these possibilities.

But as long as the movie exhibition brass and the callous production heads calculate that they can continue to draw their unconscionable salaries, bonuses and dividends right up to the moment the storm breaks, the labor forces in this industry are reduced to a pitiful impotence.

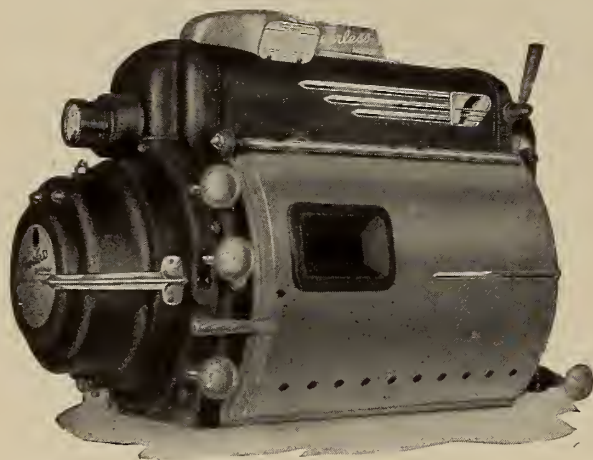
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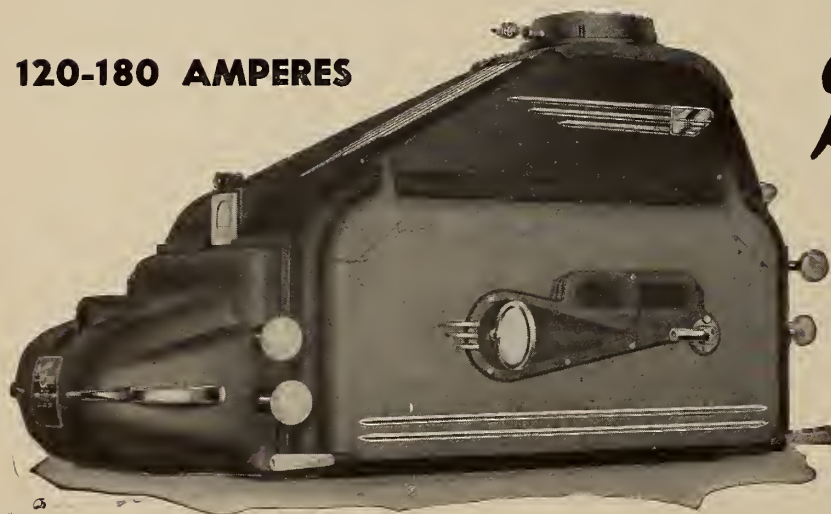


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The 35-mm Projection Positive Film

By ROBERT A. MITCHELL

IV. The Film Base: Nitrate and Triacetate Stock

WHILE various types of non-inflammable film stock have been tried from time to time ever since the earliest days of motion pictures, nitrate stock has been used almost exclusively for professional films because of its superior wearing qualities. Nevertheless, dissatisfaction with nitrate film has been voiced frequently by exhibitors, projectionists, and exchange workers because of its dangerous inflammability, and by custodians of film libraries because of its impermanence.

The search for non-inflammable film-base plastics failed to produce a commercially acceptable material, however, until 1946 when the Eastman Kodak Company introduced high-acetyl safety film and immediately instituted an intensive manufacturing program aimed at the complete replacement of nitrate stock by 35-mm safety film.

Curiously, there is nothing new about cellulose triacetate, the chief ingredient of high-acetyl safety base. Much of the literature on cellulose plastics published during the period 1905-1910 contains numerous references to the triacetate of cellulose. In fact, as early as 1910 the nitrates, acetates, formates, propionates, butyrates, palmitates, stearates, benzoates, acetonitrates, acetopropionates, acetobutyrate, propionobutyrate, etc., of cellulose had been the subjects of intensive research.

The present belated flurry of activity on the part of film manufacturers in the cellulose triacetate field may be attributed, in part, to improvements in methods of manufacture.

Requisites for Projection

Any film stock intended for use in theater projection must measure up to high standards on the score of (1) tenacity (2) pliancy (3) permanence toward water (4) permanence toward heat (5) flammability characteristics (6) permanence toward time, and (7) transparency.

Table A shows that new nitrate film of good quality is somewhat superior to high-acetyl safety film in tenacity and pliancy; is inferior in transparency and permanence toward heat; and is vastly inferior to high-acetyl film in flammability characteristics and permanence toward time.

The two types of film are comparable in the matter of permanence toward water, a matter of considerable import-

by a too rapid shrinking during the drying stages.

But Table A does not tell the whole story. After prints have been subjected to considerable use—say, to 50 or more projections and to numerous transits to and from theaters—the superiority of nitrate over high-acetyl film in the matter of tenacity and pliancy almost vanishes. Why is this?

Relative Deterioration Characteristics

The data on permanence toward heat and time show that whereas nitrate film deteriorates rapidly by repeated exposure to heat and with age (weakening the film and increasing its brittleness) high-acetyl safety film is relatively immune to these causes of film deterioration, and therefore retains its original physical properties almost indefinitely.

The greater degree of cold flow of high-acetyl film, however, indicates that this type of film stock is more susceptible to "curl deformation" than is nitrate, thus giving rise to somewhat more pronounced focus-drift effects. This is unfortunate; but it is entirely possible that this defect will soon be overcome by incorporating special materials with the plasticizers used in the manufacture of the film.

Specific physical data anent the two types of film base are given in Table B.

Nitrocellulose Fire Hazard

Nitrate motion picture film is dangerously inflammable. The emulsion-supporting base of this type of film is celluloid, a plastic material consisting of the

NOTE: Tables A and B appear on the pages immediately following.

ance to processors, who fear slack loops caused by excessive film swelling in the developing machine and excessive tension and distortion of the film caused

lower nitrates of cellulose (chiefly cellulose tetranitrate) mixed with plasticizers such as camphor, butyl phthalate, tricresyl phosphate, and castor oil. A mixture of more highly nitrated celluloses, such as cellulose hexanitrate, is familiar as "nitrocotton" or "guncotton."

Although guncotton is capable of exploding when struck sharply, as with a hammer, the pyroxylin-type mixture of lower nitrocotton in nitrate film base does not explode in the true sense of the word. In fact, nitrate film base cannot explode even by ignition (intense heating) except under phenomenally high pressures (3,000 or more atmospheres). The so-called film explosions are really explosions of the gas produced by burning nitrate film.

Ignition Level—'Flash Point'

Nitrate film base, like any other material containing large proportions of nitrocellulose, burns fiercely because it is a very unstable chemical compound which contains within itself sufficient oxygen to maintain vigorous combustion. As a matter of fact, a blazing reel of film continues to burn even when dropped into a tank of water, as the accompanying photograph shows.

The ignition temperature, or "flash point," of nitrate film varies somewhat with age, new film igniting at about 180° C. and old film at about 120° C. A statement made to this effect in an earlier contribution by the writer¹ was criticized by a spokesman for a well-known film research laboratory in the following words:²

"The article also points out that 'old film has lost some of its camphor and is therefore more dangerously inflammable than new film.' Although it is often true that very old film may be more dangerous than new film, this increased hazard would be almost entirely due to increased likelihood of breaks in the film rather than loss of camphor."

Ignoring the likelihood of breaks in old film, which is true but irrelevant as regards intrinsic inflammability, it may be stated as the opinion of authorities that aged nitrate film which has suffered incipient decomposition — principally through loss of plasticizing materials— burns more violently than the factory-

¹ "The Anatomy of Nitrocellulose Film: Its Import to the Projectionist" by Robert A. Mitchell; IP for February 1948, p. 5.

² "Nitrate Film Symposium"; IP for April 1948, p. 10.



FIG. 1. Nitrate film burning under water.

fresh product.³ Further, Max Scharnberg, Cine Engineer and Instructor at the Copenhagen (Denmark) Institute of Technology states:⁴

"Films soften and melt at about 90° C. Old film may ignite at 120° C., and new film at approximately 180° C."

Table C gives the reader a rough idea of the temperatures of various incandescent solid and liquid bodies. But it must be kept in mind that the table is based on "black-body" radiation, hence it is not valid for incandescent gases or luminescence produced by ionization.

Table C reveals that the glowing tip of a cigarette (dull red heat) has a temperature of about 1,000° F., and is capable of igniting nitrate film almost instantly.

Causes of Film Fires

Serious film fires usually start in the projector, but a large number of other causes is known. It has been determined by experiment that when the douser is opened to allow the full beam of the arc lamp to impinge upon film threaded up in a motionless *cold* projector, nothing more serious than the burning of a hole through one frame of the film ordinarily occurs. This is because the metal gate in which the film is enclosed conducts heat away so rapidly that the film is cooled below its ignition temperature.

Only when the gate is rather hot (as is often the case) will the flame strike up to the upper film loop or burn down past the intermittent sprocket and ignite the lower loop. And the principal factor here appears to be the distance by which

³ "Aged celluloid which has lost a portion of its camphor burns more rapidly than that recently manufactured." "Celluloid," Masselon, Roberts, and Cillard, p. 183.

⁴ From the official and authoritative textbook, "Films-og Tonefilmsteknik" ("Motion Picture and Soundfilm Technique") by Max Scharnberg, p. 37.

TABLE A. COMPARISON OF NITRATE AND TRIACETATE FILM BASES

Property	Nitrate	Triacetate
(1) TENACITY:		
(a) Tensile strength	100	95
(b) Tear strength	100	70
(2) PLIANCY:		
(a) Flexibility	100	95
(b) Elasticity	100	75
(c) Cold flow	100	115
(3) PERMANENCE TOWARD WATER:		
(a) Tendency to swell	100	100
(b) Time of shrinking	100	100
(4) PERMANENCE TOWARD HEAT:		
(a) Tendency to emboss	Slight	Very slight
(b) " to become brittle	Great	Negligible
(c) " to shrink	Moderate	Slight
(5) FLAMMABILITY	Explosively inflammable	Difficultly inflammable
(6) PERMANENCE TOWARD TIME:		
(a) Tendency to shrink	Great	Very slight
(b) " to become brittle	Moderate	Negligible
(c) " to discolor	Slight	Negligible
(7) TRANSPARENCE	100	103

TABLE B. COMPARISON OF PHYSICAL AND CHEMICAL PROPERTIES

Property	Nitrate	Triacetate
Estimated storage life	50 years	1000 years?
Effects ultraviolet radiation .	Discolors and becomes brittle.	No change.
Light transmission:		
Red	89%	90%
Orange	88%	90%
Yellow	88%	90%
Green	87%	90%
Blue	86%	90%
Violet	85%	88%
Softening point (approx.)	90° C. (194° F.)	100° C. (212° F.)
Decomposition temperature	100° C. (212° F.)	200° C. (392° F.)
Ignition temperature:		
(a) New film	180° C. (356° F.)	800° C.? (1,472° F.?)
(b) Old film	120° C. (248° F.)	800° C.? (1,472° F.?)
Manner of burning	Explosive.	Very slow.

the film is separated from the middle portion of the gate, or, to state the matter another way, the distance that the film tracks, or runners, protrude beyond the flat part of the gate in which the aperture is situated.

It is therefore safe to conclude that a bad film fire *can* occur when the film breaks at the intermittent sprocket, or between the intermittent and the aperture.

The first effect of the film stopping dead in the aperture is a "burn-out" in from $\frac{1}{2}$ to $\frac{1}{4}$ second for low-powered arcs (with no significant difference between high- and low-intensity lamps) and in about $\frac{1}{8}$ to $\frac{1}{16}$ second for the most powerful high-intensity arcs.

In normal operation (24 frames per second) each frame of the film stands motionless at the aperture for about $\frac{1}{32}$ of a second when a standard " $\frac{3}{4}$ to $\frac{1}{4}$ " Geneva intermittent movement is employed. In front-shutter mechanisms (without rear shutters) the film is exposed to the light beam for slightly more than $\frac{1}{32}$ of a second, and in rear-shutter mechanisms for about $\frac{1}{48}$ of a second.

Because the film gate, itself, becomes twice as hot in a front-shutter than in a rear-shutter mechanism, the use of front-shutter mechanisms in theater projectors is to be condemned. (This, of course, does not apply to machines having both front and rear shutters for the purpose of effecting a more rapid cut-off of the light.) Excessively hot gates not only increase the likelihood of disastrous film fires, but cause physical damage to the film.

Defective and worn projection equip-

ment is an important cause of film fires, and so, too, is even the newest and best equipment when it is manned by incompetent and unskilled projectionists. But possibly the most important trouble-causing factor is the circulation of torn, brittle, badly worn, and imperfectly repaired prints.

Although the automatic fire-shutter is by no means a great protection against film fire, the faulty operation of this device undoubtedly increases the risk of fire when nitrate film is used. Accidental contact of the film with hot machine parts when threading has caused serious fires; as has, also, smoking by the projectionist while threading or rewinding film, and the placement of heaters, unshielded radiators, and spark-emitting motors or switches near the rewinder or film cabinets. Placing hot carbon stubs in a receptacle on or near the rewind

bench or film-storage cabinets is likewise risky business.

Important Safety Rules

Observance of the following rules by the projectionist will help reduce the possibility of film fire.

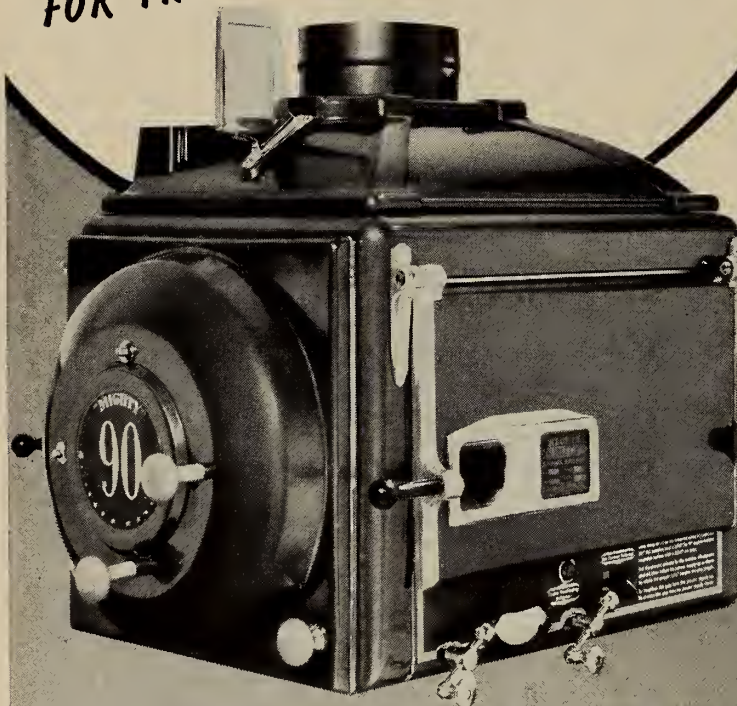
1. Do not smoke in the projection room.
2. Thread the projectors carefully, and always check the film path by turning the hand-wheel.
3. Do not permit film to come into contact with heated projector parts when unwinding a length of leader from the upper reel preparatory to threading.
4. Repair prints carefully, checking every splice, and use only the very best nitrate film cement and a clean, perfectly adjusted splicer.
5. Refuse to project films too defective to be repaired in the time allotted for film inspection. (When receiving bad prints immediately notify State or municipal authorities.)
6. Keep films away from radiators or heaters.
7. Guard against dropping hot carbon stubs onto film.
8. Do not throw carbon stubs into the film waste can.
9. Immediately close the lamphouse douser after each shutdown.
10. Do not allow dirt to collect and jam fire-valve rollers, and keep all projector parts absolutely clean and in perfect adjustment.
11. Do not use matches to probe dirt from a loaded projector.
12. Keep the magazine doors of a loaded projector closed at all times.
13. Keep all films which are not in use or being inspected in the fireproof storage cabinets provided for them.
14. Do not lay a hot soldering iron on the rewind bench or near the film cabinets.

When a reel of film ignites, the com-
(Continued on page 32)

TABLE C. COLOR SCALE OF TEMPERATURE

Color	Approximate Temperature	
	Centidegrees	Fahrenheit
Incipient red heat	500	930
Dull red heat	600	1,100
Bright red heat	800	1,500
Orange-yellow heat	1,100	2,000
Yellow-white heat	1,600	3,000
Bright white heat	3,500	6,000
Blue-white heat	10,000 to millions.	18,000 to millions.

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Theatre _____

Street _____

City and State _____

By M. D. BOATRIGHT

The author holds a B.S.E.E. degree, is a charter member of IA Local 817 (Fayetteville, Ark.), has worked as a projectionist, has been a broadcast engineer, and is now an electrical design engineer. He introduces his article by the following imaginary advertisement:

WANTED: Top-flight projectionist desires responsible position with steady income.

THERE is no doubt that the appearance of an advertisement similar to the foregoing would be almost unheard of at this moment, but it is a grave possibility that such copy may be commonplace within a short period of time.

All of us have noted the ever-increasing tempo of articles and comments concerning the rising popularity of television. A good many of these comments have been coupled with similar information concerning a falling away of interest in motion pictures. A 25 to 50% decline in attendance among those owning Tv sets is not unusual, so we can easily conclude that as Tv sales go up, box office receipts will be reduced by some proportionate amount.

Reduction in Theaters, Wages?

The inevitable result of lowered receipts must of necessity be some sort of action by the theater owners and managers. Depending upon the amount of cut-back necessary for the owners in order to make ends meet, there will most likely be a reduction in the number of theaters or the number of projectionists (fewer operating hours available), or possibly both. No matter what perspective is taken, it appears that the projectionist will suffer in the form of reduced wages or no wages in some instances.

Some projectionists tend to be over-optimistic concerning their future because of certain securities embodied in the IA organization. It should be realized that this security can exist only as long as there is progression in the industry, and further that this progression is up to the individual members themselves.

Even a child today is not foolish enough to try to place four pegs in three holes, yet we find supposedly intelligent individuals who reason that three vacancies can be filled by four men.

United Craft Action Urged

The picture thus painted represents a rather dim view of the projectionist's future, but such speculation is justifiable in view of the present trend and the aloof attitude of the projectionist toward Tv. As a matter of fact, this discussion was precipitated by a recent abstract from the *Journal of the Society of Motion Pic-*

ture Engineers which, in speaking of an effort of the SMPE to secure frequency allocations for theater Tv, states:

"However, active interest and diligence must be shown in order to obtain allocations and, at the present time (1949) the motion picture industry has shown little interest in television."

This lack of interest might be attributed to a lack of previous experience by the industry with competition on such a plane, or possibly to the fact that many do not realize the far-reaching effect of

to those who have no Tv sets, or to those who do not have access to a set via friends, restaurants, etc. As this group diminishes, the need for theater Tv will also diminish, and then a new scheme of alliance must be found. It is not without possibility that a solution to this problem could be found by investigating the customer himself.

Most Tv set owners who have given up periodic theater attendance have done so, we find, not so much because of the quality of theater programs but more

Whither Motion Picture Theatre Audiences?

WPIX, the New York News station, is the flagship of one of the largest "celluloid networks" in television. Currently serving 26 stations in 22 cities throughout the country, WPIX has supplied film to as many as 37 video outlets during the past year. WPIX is offering two feature film packages, a group of Westerns now showing on 20 stations; "Film Package No. 3" seen on 15 outlets, and several series of short subjects.

"Film Package No. 3" includes such outstanding pictures as "A Star Is Born," "The Beachcomber," and "Wings of the Morning." There are 36 films in the Western package, and 13 in "Film Package No. 3." The recently concluded Korda series of 24 were shown by 22 Tv stations.

An average of three hours a week of film is supplied by WPIX to each of the 26 stations. One station takes as much as 5½ hours per week. The popular Western series is being re-run by four stations.

the Tv industry in altering movie-going habits.

Many industries or individuals have most effectively met competition not by ignoring it but by making use of competitive techniques and even absorbing the competition into one organization. Projectionists, as a craft, might be wise to be seeking a scheme whereby the Tv industry will become so closely allied to the motion picture industry that he is an integral part of both. If the projectionist can find some means of employing Tv to expand the motion picture industry, his future will indeed be secure.

Home Set Increase Important

Several schemes have been proposed to date that more closely ally the two industries, but none has received the needed support to be carried through. Theater Tv has been carried further than most but still leaves a number of things to be desired as far as customer appeal is concerned.

This type of program can appeal only

because of the convenience of professional, living-room entertainment. Even though a number of Tv programs are comparatively below motion picture standards, there are a large number of people who prefer to accept this difference in order to stay at home.

If individuals so much enjoy the convenience of no travel and living room entertainment, then why not bring present day movies into the home—for a price, of course? One method that has been suggested is that of working with the local telephone exchange as a distributing agent. This appears to offer definite advantages and might be possible in the following manner:

Distribution via Telephone

Each theater in a Tv locality would make use of their present facilities for reaching their present clientele and would install a "beam-splitter" and an iconoscope which would pick up the projected image at its source. The program would be fed to the local telephone

exchange, where it would be distributed to Tv owners in a manner similar to present telephone distribution.

Program Selectivity

This means that a Tv owner may select any movie that he or she may wish to see, merely by calling the local telephone company and asking to be connected with the desired program. Time schedules could be maintained as already set up, with program information distributed by local newspapers and the telephone distribution center. The fee for these services might easily be included with the monthly telephone bill,

each program being itemized in a manner similar to long distance calls. This would result in a profit not only for the distributor but also for the theater owner and consequently preserve all present projectionist's activities.

The information set forth in this article is by no means a complete solution to the problem, but it does present a few ideas from which the projectionist may choose to proceed. To those seriously interested in preserving their security, now is the time to do something about it. To parallel an old adage we might say, "act now or forever hold your peace."

Nitrate Film Ignition by Static Discharge

CAN nitrocellulose film be ignited by a static discharge? This question is answered in the affirmative, with certain qualifications, by a recent article in *The Ideal Kinema*, British motion picture technical journal edited by R. H. Cricks, whose name is rather well known to IP readers by reason of frequent references appearing in these pages. Recounting an experience at a West End, London theater, Mr. Cricks reports:

On the program was the French film, "Symphonie Fantastique." The chief projectionist, S. Baker, had started spooling this up when it burst into flames. He fortunately escaped with singed eyebrows, but the rewind room was blackened and the rewinder twisted and ruined.

When I went around the following morning, Mr. Baker drew my attention to a sickly smell which clung to the rewind room, and which he said, he had noticed when he opened the tin film container.

The matter was, of course, investigated by the fire brigade, whose report states: "The fire was caused through the film which just before delivery to the theater had been given a 'surface' treatment. This treatment contained an acetone base which gives off an inflammable vapor. During winding a static spark ignited the inflammable vapors, which, in turn, ignited the film."

Eastman Kodak's Opinion

I submitted some unburnt sections of the reel to Kodak (the film was printed on French Kodak stock). In a preliminary report, B. J. Davies states:

"The leaders and trailers are on stock manufactured in this country and are significantly fresher than the small samples of the original picture. These small samples are well worn and somewhat brittle. Both these points indicate that the film is old, to the extent that

the solvents in the base have dried out to a considerable degree.

"The small samples have negative perforations and the base has a slight blue-green tinge. The film is lavender dupe positive and was coated during 1945."

In a subsequent report Mr. Davies stated: "Chemical decomposition of nitrate film does not occur until the film is at least 15 years old, and has the effect of making the base soft and sticky. The samples I have show no evidence of this effect.

Peculiar Odor Cited

"With regard to the peculiar smell . . . I noticed it myself when I opened the tin. In fact, I still do, though to a lesser extent, in spite of the handling the film has received by myself and others. The film has definitely not been treated, in the sense that the laboratory has not coated the gelatine side with a protective layer such as carnauba wax. I would, however, suggest that the labora-

tory be asked if the film has been cleaned with some solvent to remove dirt and oil.

"If, in fact, the laboratory cleaned the film with a volatile inflammable solvent, and then immediately packed the film in tins, it would be possible for there to be a sufficient concentration of fumes to ignite when the film was rewound. This, of course, presumes that there was heat or flame present to start the fire.

"Whether static itself would, in these circumstances, start a fire is a moot point on which nobody with whom I have discussed the matter has any experience to base an opinion."

Notwithstanding these views, G. F. D.'s despatch (exchange) manager asserts definitely that the copy had not been processed or treated.

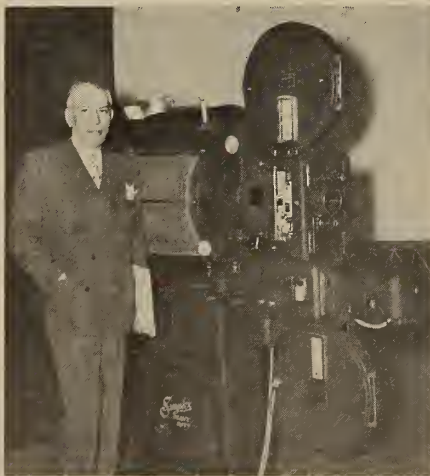
Accumulation of Static

Static has, of course been blamed for many film fires. When one winds a roll of film in the darkroom in dry weather, one can see blue flashes coming from it; but with fresh stock such flashes are quite harmless. Nevertheless, the foregoing reports prove, I think, beyond question that it is possible for inflammable vapors to be ignited: in the present case these could have emanated only from a film which has been stored under imperfect conditions.

I have described this happening in some detail, because it does provide an object lesson to both distributors and projectionists. It is an accepted fact that when films are kept in storage they should be rewound at regular intervals to prevent decomposition. Every distributor holding stocks of old films should ensure that this is done, for the sake equally of the films and of projectionists who may run them.

Equally, any projectionist running an old film should rewind it for the first time very slowly in order to prevent the risk of static; a damp atmosphere is desirable. Even then there is a slight risk on the projector of a gate fire igniting the vapors inside the upper spool box.

INACTIVE ON THE OPERATING SIDE



Harry Sherman, of IP, is snapped alongside the new Simplex X-L projector at the press demonstration in IPC's Bloomfield, N. J., plant.

First X-Ray Movies Developed

Development of X-ray movies for use in studying and diagnosing heart diseases is announced by the University of Rochester. An X-ray motion-picture camera was developed to photograph flow of blood, treated with an injection of opaque dye, through the heart and its vessels, with the possibility of showing up diseases. It was believed this was the first use of X-ray movies in heart disease diagnosis.

The disclosure, made as the first newsreel on X-ray movies by Paramount News, was released in movie theaters throughout the country.



He gives shape to things to come...

HIS the ability to see each script through the camera's eye . . . to picture with brush and pencil the story's dramatic highlights . . . and, finally, to shape sketches into settings of authentic merit.

He is the screen's art director, at once responsive and responsible. Not only must he be sensitive to the mood of the story . . . giving full consideration, as well, to the personality of the star . . . but

also he must be constantly aware of the practicalities of motion picture production, be able to work closely with scores of crafts within and without the studio.

Above all, the art director knows the importance of the faithful reproduction of the values he creates . . . an assignment he is well content to see competently handled by Eastman's famous family of motion picture films.



EASTMAN KODAK COMPANY

ROCHESTER 4, N. Y.

J. E. BRULATOUR, INC., DISTRIBUTORS

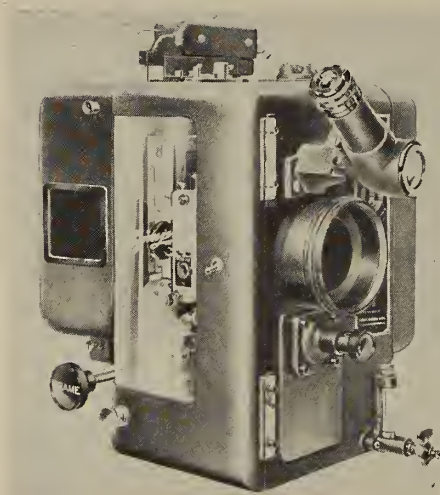
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CULMINATING a five-year period of designing and tooling-up, plus an exhaustive series of field tests in ace circuit theaters operating 14 hours daily over a span of 16 months, the new Simplex X-L 35-mm projector mechanism was given its first public demonstration recently before members of the press by International Projector Corp. at its factory in Bloomfield, N. J.

This new mechanism incorporates several radical departures in design and operation from previous Simplex projectors—in fact, from existing practice with any other projector—and it was the consensus that Simplex engineers had reached their goal of producing a mechanism of top-flight efficiency, complete reliability, economy of operation, and long life.

The Simplex X-L has impressively clean lines and evidences the wealth of

Simplex X-L operating side (left). Large glass panel and lighted interior expose mechanism to view over a wide angle of vision. Enlarged sight box. New lens mount for lenses up to 4" diameter and F:1.6 speed. Unique Screenscope above lens enables precise focusing by knob located just below. Built-in changeover at top rear. Rounded corners of white-enameled film compartment afford maximum cleanliness.



Spray-O-Matic lubrication system (right) constantly covers every inch of this sealed compartment with a fine spray of oil which gently bathes every surface. Not a drop of oil can reach the film. Full-view gouge at lower left indicates oil level at a glance. Theaters operating the Simplex X-L 14 hours daily for the past 16 months have not had to change the oil.

The New

Simplex X-L 35-mm Projector Mechanism

fine design and advanced manufacturing technique which went into its production.

Advanced Operating Aids

On the operating side of the projector head, as a starting point, there is a large glass panel which, together with the illuminated film compartment, enables the projectionist to see, at an appreciable distance and over a wide angle of vision, the entire mechanism while it is running. The vital aperture area is also exposed to view by means of an enlarged sightbox having eye-protective glass which precludes the need for stooping or squinting in an awkward position.

With high-speed lenses the order of today and tomorrow, the Simplex X-L scores a major advance in projector design with a new lens mount which can accommodate any projection lens up to and including 4 inches in diameter and having a speed of F:1.6. Many theaters, and particularly drive-ins, have been severely handicapped in the past by the absence of such a large lens mount. This Simplex X-L mount will satisfy all foreseeable requirements in this respect.

Incidentally, several leading lens manufacturers have recently announced the availability of new large-diameter, long-focal-length, high-speed lenses.

The film compartment is of gleaming white enamel, and all corners are rounded so as to collect a minimum of dust and dirt and to render the removal of that minimum a quick and easy task.

The built-in changeover unit is of the instant-acting, zipper type which is designed to give unfailing, trouble-free service for many years.

Spray-O-Matic Lubrication

Field tests under actual theater operating conditions for more than a year indicate that the Simplex X-L lubrication system, termed Spray-O-Matic, is one of the most efficient ever devised for so precise a mechanism as a motion picture projector. The entire area of this sealed drive compartment is sprayed continually by a fine film of oil which reaches every drive unit down to the last gear tooth. Still, not a drop of oil can reach the film.

The oil-feed unit is simplicity itself, comprising a high-speed pump, a filter and a pipe. An oil gauge, having a petcock for drainage, indicates the oil level at a glance. Simplex engineers relate how the projectionist in one of the theaters which tested the X-L mechanism for more than a year stated that the petcock was of little use, since he hadn't changed the oil for 16 months and it still was so

clean that he could "almost drink it."

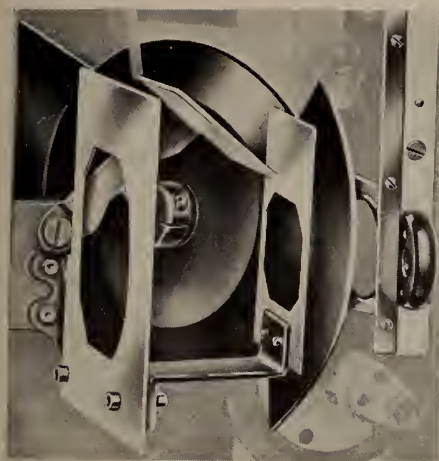
New Conical Shutter

One of the most radical departures from conventional projection practice is the conical shutter used in the Simplex X-L. This single-unit, built-in rear shutter is so positioned as to intercept the light beam at its narrowest point—only 1 1/8 inch from the aperture. This new design is held to effect the maximum cutoff of light yet achieved in any projector, with fewer parts, less gearing, and quieter operation.

To attain comparable results with the conventional dual shutter, Simplex engineers state, would require multiple moving parts and more gearing, and it would be necessary to reduce the shutter blade width and risk introducing travel-ghost in the screen image.

The extremely close positioning of this simplified shutter to the aperture enables it to serve another important purpose, since it carries on its film side a series of small vanes which effectively splay cooling air over both the aperture and the film.

Adjustment of this conical shutter is easily accomplished on the Simplex X-L by merely turning a knurled knob atop the projector housing. Eliminated is the



Radically new, single-unit conical shutter built-in only $1\frac{1}{8}$ inch from aperture at narrowest point of light beam affords ultra-sharp cutoff and maximum light transmission, with fewer parts, less gearing and quieter operation. Shutter is adjusted by simply turning a knurled knob atop the projector housing.

need for changing the relationship of driven gear to the driving gear, and there is the added advantage of equal wear on the contacting parts.

24-Tooth Sprocket

Another innovation on the Simplex X-L projector is that both upper and lower sprockets have 24 teeth, 8 more than the conventional type, and they operate at only 240 r.p.m., a reduction in speed of $33\frac{1}{3}\%$ over ordinary sprockets.

This increase in the number of sprocket teeth has two obvious advantages: (1) the greater radius enables a wider bend, a better wrap of the film and minimizes the danger of weak patches coming apart and eases the transit of damaged film, and (2) the reduction in speed should effect a substantial decrease in sprocket, gear and bearing wear.

Reduced Mechanical Load

Both sprocket assemblies are unit-constructed as an aid to improved performance, easier maintenance.

The main gear drive assembly of the

Simplex X-L, a single vertical unit, is extremely simplified. This simplified gearing, operating in sealed ball bearings, Simplex engineers emphatically state, effects a reduction in mechanical load over conventional practice of 80% at the start and of $66\frac{2}{3}\%$ while the mechanism is running.

Since the great majority of projector breakdowns are caused by excessive mechanical load in both starting and running the mechanism, the Simplex X-L gear assembly should practically eliminate gear stripping and effect a radical decrease in running wear and in operating costs.

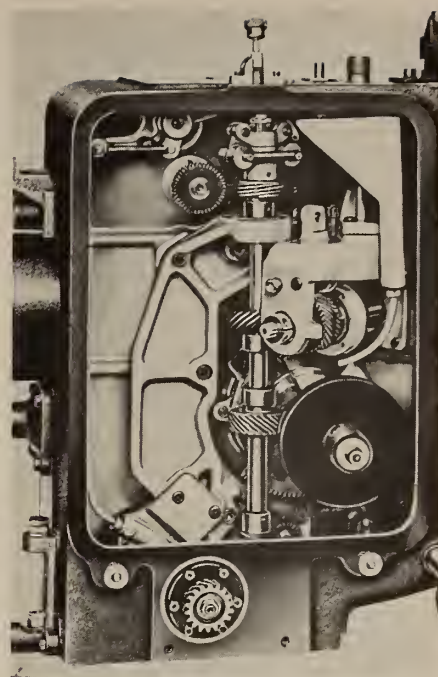
The entire gear train turns on sealed ball bearings, with sleeve bearings having been eliminated. Friction is completely suppressed, thus reducing the mechanical load over-all. The gears in this assembly are of case-hardened, polished, finest-quality steel meshed with a phonolic fabric made especially for gears.

Contributing importantly to long gear life in the Simplex X-L is the fact that during the necessary frequent framing operation *all* gear teeth always mesh with the *same* mated gear, thus effecting an even distribution of wear for *all* teeth on both gears.

Unique Focusing Screenscope

The micromatic Screenscope is a projection "first." This built-in unit utilizes an 8-power lens with prism to insure swift, precise focusing of every type of film print. Guesswork is eliminated, as the projectionist need only sight through the Screenscope while he manipulates the focusing knob positioned handily nearby.

The Simplex X-L intermittent movement is of completely new design. The flywheel is mounted directly on the cam, which enables the elimination of intermediate gearing and results in less wear, quieter operation and sharply reduced maintenance costs. A film of filtered oil flows over all working surfaces and carries away even the most minute particle of every foreign substance, without permitting a single drop of oil to reach the film.



Simplified gear train, a single vertical unit, assertedly reduces mechanical load over usual practice by 80% at the start and by $66\frac{2}{3}\%$ while running. During framing all gear teeth always mesh with same mated gear teeth for even wear distribution. Gear train turns on sealed ball bearings. Oil reservoir is at bottom of compartment.

One of the best operating aids yet developed, another projection "first," is the frame lock indicator. Heretofore no projector provided a certain means for determining whether the star and cam of the intermittent movement were in a true locked position, a requisite for correct framing.

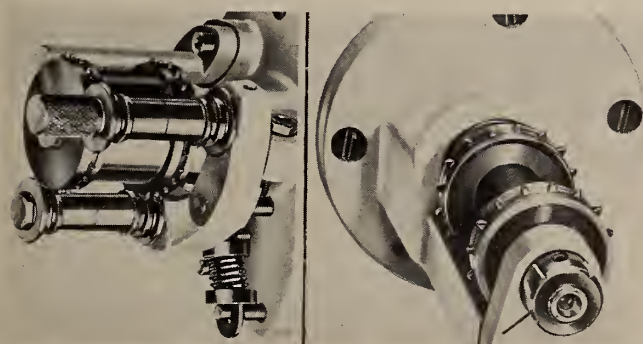
The distinct white lines and pointer on the knob at the fore end of the intermittent movement give instant visible evidence of a positive lock between star and cam. Here again, guesswork has been eliminated by a positive aid to precise, quick and easy operation.

Film Gate—Trap Assembly

Another marked advance in projection practice is apparent in the Simplex X-L film gate. The extra-long tension shoes exert an equally exact tension on both edges of the film. These tension shoes are practically self-adjustable laterally to accommodate varying film widths.

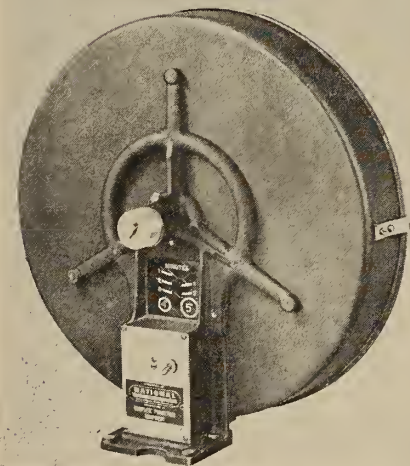
The knob marked "Increase" operates a 5-step control which locks at each position and applies the correct tension for all types of film prints—new and green, old and shrunken, a trifle thicker or thinner. Again chance and guesswork have been supplanted by positive, visible evidence of correct operating conditions.

The film trap has a curved plate which enables proper positioning of the film between the guide rollers and insures a true, direct path to the guide rails. Just



Upper and lower sprockets (left) have 24 teeth, 8 more than usual. Operating at only 240 r.p.m., a reduction in speed of $33\frac{1}{3}\%$, they reduce load and wear on all components. Greater radius affords a wider bend, a better wrap of film, minimizes patches pulling apart and eases transit of damaged film. Both sprocket assemblies unit-constructed. Inter-

mittent movement (right) designed to eliminate intermediate gearing and to reduce wear. White markings and pointer at fore end, the frame lock indicator, give instant visible evidence of positive lock between star and cam for accurate framing.



Film magazines are deeper by $\frac{1}{4}$ " on each side of reel. Large observation window (upper) has illuminated film footage markings for either 4" or 5" reel hubs. Reverse side of magazine (lower) also has footage markings. Spindle has backlash-free friction device. Tension is easily adjustable in steps.

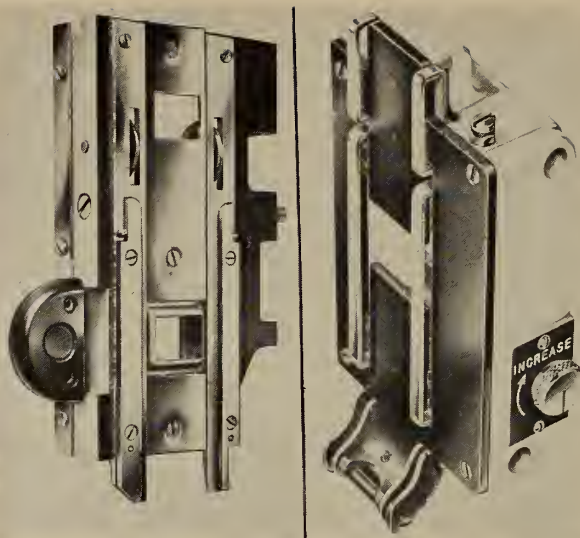
above the film aperture is a framing aperture which, illuminated when the housing door is opened, affords precise, quick framing. Ample "finger room" makes threading a fast, easy operation.

Both the film gate and trap are removable by a simple hand operation.

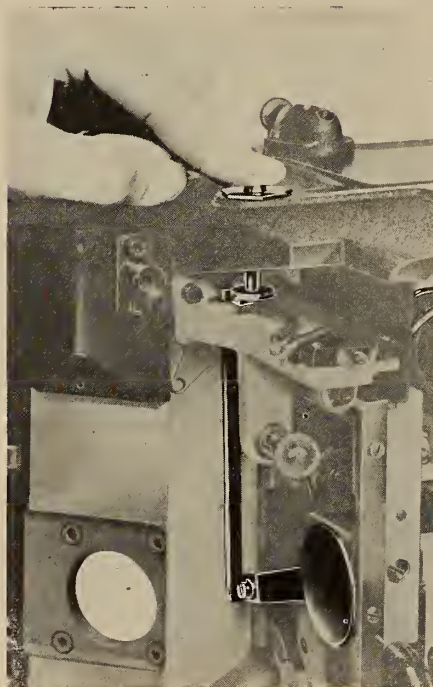
Improved Film Magazines

Simplex X-L magazines are $\frac{1}{4}$ inch deeper on each side of the reel, thus preventing reel contact with the side walls and allowing the projectionist more working space. The upper magazine has a large observation window with illuminated film footage markings for either 4- or 5-inch reel hubs, and even the small 2-inch reel hub is visible at an appreciable distance. Improved fire valves and rollers are easily cleaned.

On the rear side of the upper magazine there is also an observation window with film footage markings. A light switch is provided for illuminating the interior. The reel spindle has a backlash-free friction device, and holdback tension is easily adjustable in steps. There



Film trap has a curved center plate for correct positioning of film to insure true, direct path to guide rails. Just above film aperture is an illuminated aperture which affords precise framing. Merely loosening, not removing, one captive screw permits quick trap removal. In the film gate longer shoes exert equally exact tension on both edges of the film. The knob marked "Increase" operates a 5-step control which locks at each position and affords correct tension for all types of prints. The shoes are practically self-adjustable laterally for varying width.



New automatic safety shutter can be reset while projector operates. If the upper film loop enlarges momentarily, a plunger atop the housing is held depressed until loop is corrected to proper operating length.

is no trace of end thrust with the self-lubricating Oilite bearings.

The lower magazine also has an observation window. The reel spindle is fulcrum-mounted and will accommodate any size reel hub and still maintain positive even tension.

Uni-Tension Takeup

The Uni-Tension takeup assembly utilizes an all-ball-bearing cone drive which eliminates friction and provides for a self-adjusting, uniform tension. Cinching and scratching of the film are prevented, as are torn sprocket holes and hooked sprocket teeth. Provision is made for smooth operation over a wide latitude,

since reel hubs of from 2 to 5 inches may be used. The takeup assembly is available with either round or V belt.

In design, construction and in all phases of operating precision and convenience, the Simplex X-L projector mechanism is a worthy addition to the projection products which down the long span of years have earned Simplex its international reputation as a manufacturer of fine motion picture equipment.

The Simplex X-L projector is now on display at all branches of National Theater Supply Co.

Kodak Color Film Booklet

To assist photographers in keeping color films properly, both before and after exposure as well as after processing, Eastman Kodak Co., has just issued a new booklet, "Storage and Care of Kodak Color Films."

The booklet discusses care of film in general and color films in particular, especially insofar as protection of unexposed films in the original package, protection of films after the package is opened, storage of processed films, care of processed films, and general precautions for storage of Kodak Color Films are concerned.

Free copies of the booklet may be obtained by writing direct to the Sales Service Division, Eastman Kodak Co., Rochester 4, New York.

Hotchkiss Named Westrex Manager

Fred H. Hotchkiss has been appointed Eastern Division manager of Westrex Corp. This appointment follows the merger of the talking picture activities of the ERPI division of Western Electric Co., Inc., with Westrex.

Reeve O. Strock, Westrex recording manager, will assist Mr. Hotchkiss in handling the technical aspects relating to studio recording equipment and its operation.

AIR COOLING

of Motion Picture Film for Higher Screen Illumination†

By F. J. KOLB, Jr.
Eastman Kodak Company

The second installment of a series of three articles which detail the experimental setup utilizing high-velocity air jets directed at the film aperture and which reportedly resulted in an increase of from 30 to 60 per cent in permissible flux and in attainable screen illumination.

FOR these experiments, a radiation source for producing more energy than the present commercial projection lamphouses was necessary. The Peerless Hy-Candescent lamphouse was specially modified to operate with water-cooled positive jaws and permit the burning of experimental trims at currents and radiation intensities up to 65% in excess of present commercial equipment, providing an instantaneous net flux of 1.65 watts per square mm and a mean net flux of 0.99 watt per square mm.

Vycor protection plates for the condensers were used, since these experimental trims burning close to the condenser tend to cause excessive pitting and spattering of the silica condenser lens. Furthermore, a 1/8 inch thickness of Vycor is effective in preventing solarization and the resulting loss in transmission of the silica condenser.

Our test projector is a Simplex E-7 with the gate modified to permit the introduction of air-cooling nozzles. The projector was operated with a 60% rear shutter and over-all shutter transmission to the screen of 50%.

Air Compressor Used

The air supply was obtained from the pressure tank of an air compressor, with the air throttled down so that it entered the nozzles at a pressure of only a few pounds per square inch. For the pressure and flow rates found necessary in the particular equipment tested, a rotary blower would have been a more satisfactory and less expensive source of low-pressure air.

A number of nozzles of different de-

sign were tested for cooling efficiency. These nozzles range from 0.007 to 0.14 square inch in area and were found to operate best with a free-air velocity at the nozzles from 250 to 500 feet per second. It should be pointed out that the choice of a suitable nozzle is a compromise among cooling efficiency, ease of mounting and direction, method of construction, space available, and freedom from interference with the normal projector performance.

FIGURE 1
Cooling cine film by high-velocity air. Heat-transfer coefficient as a function of air velocity for several types of nozzles. (Gross coefficients not corrected for losses by radiation.) Coefficients were measured at low radiation flux densities.

Curve	Nozzle		
	Size	Description	
1	0.015" X 1.06"	Slit	4
2	0.052" X 1.20"	Slit	5
3	0.126" X 1.10"	Slit	6
			7

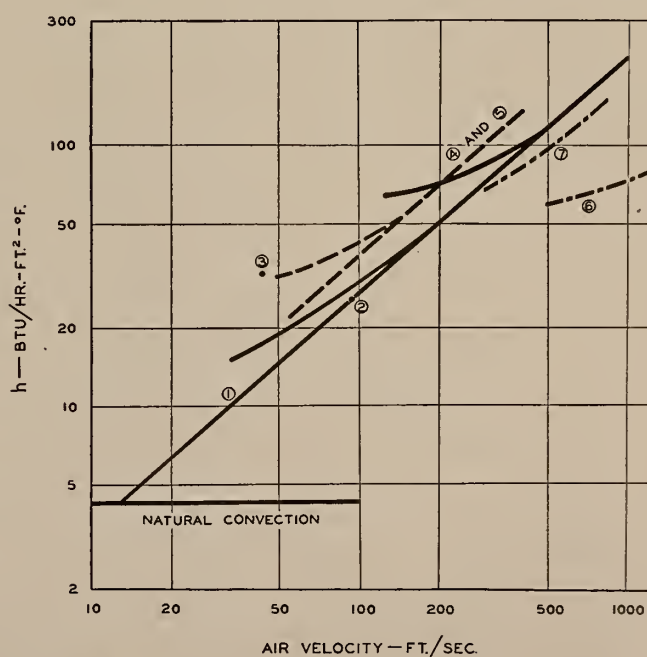
The nozzles used in this test were chosen for their ease of installation in the Simplex E-7 projector. We feel it is undoubtedly true that more efficient nozzles with a lower noise level could be designed and built, particularly if one were free to alter the rear of the projector in order to make room for an optimum installation of the nozzles.

Cooling of the Film

In order to measure how much cooling is actually obtained by air jets directed at the film in the aperture, measurements were made leading to two series of data. In the first, an approximate heat-transfer coefficient was determined for film cooled by high-velocity air; in order to make such a determination, it is necessary to know the film temperature—and as a result, measurements had to be made at very low radiation intensities such that film could be left stationary in the gate and its temperature measured with an attached thermocouple.

A second set of data was obtained making use of an experimental film containing an indicator that changed visually when its temperature threshold had been exceeded.

Measurements of the approximate heat-transfer coefficient at low radiation levels (in engineering units for convenient correlation with published data on air cooling) are shown in Fig. 1. These data must be taken as indicative only, and while we expect the basic conclusions drawn from these data to apply to all methods of air cooling, the quantitative values of the heat-transfer coefficient



depend greatly upon the type of nozzle used, its exact location in the gate, the angle which the air stream makes with the film, and the level of radiation intensity.

Examination of Fig. 1 and of related data indicates two important conclusions about the use of air jets for cooling:

- (1) The heat transfer coefficient (or the cooling efficiency) depends primarily upon air velocity and increases approximately as the 0.9 power of the velocity.
- (2) Cooling efficiency is only slightly affected by the volume of air used, and at constant velocity the heat-transfer coefficient increases only about as the 0.3 power of the air volume.

Elect to Use Air Cooling

This conclusion has been verified throughout our experimental work, and accordingly the problem of cooling film with air during projection becomes a matter of cooling with *high-velocity* air.

That this should be true is apparent when we realize that the air immediately adjacent to the film surface is relatively stationary and sheltered from the air currents which might be set up at the back of a projector, and yet all the heat lost to the air must be conducted across this stationary layer and into the many air currents of the projection booth.

By increasing the velocity of air from the jet, a scrubbing action is produced on this layer of stagnant air, reducing its thickness and reducing the insulating

effect that it has in limiting the cooling of the film. The higher the air velocity the better the scrubbing action and the less stagnant air is present to impede the rapid loss of heat from the film.

In order to supplement this work on determination of heat-transfer coefficients for stationary film with actual projection data, a different method of determining film temperature became necessary. It was found possible to make an experimental film—totally unsatisfactory as release positive but adequate for test projection—which could be made to indicate when the film had exceeded a certain temperature threshold.

Normal Projection Temperature

For these experiments, such an experimental film was used, adjusted to give an indication at a temperature level approximating that reached under normal projection with present de luxe equipment. This makes it a convenient experimental tool, since if the conditions can be so arranged that this experimental film can be projected with no change, one is reasonably sure that conventional cine positive can be projected with none of the more serious high-intensity image defects.

Figure 2 shows the results of projecting this experimental positive at high intensities with the incorporation of high-velocity air cooling. It will be seen that this experimental positive can be projected at intensities up to 0.35 mean net watt per square mm, and no change is experienced even without cooling air.

To exceed this limit, however, air must be applied—and in our particular equipment, the use of air velocities at the nozzle up to 400 feet per second permits increasing the mean net radiant flux to 0.50 watt per square mm, or an increase of over 40% with no increase in film temperature. An increase slightly beyond this limit can be obtained by raising the air velocity still higher, although the returns are diminishing.

The data of Fig. 2, therefore, show that it is possible to obtain approximately a 50% increase in radiant-energy flux on the film and still maintain acceptably low film temperatures through the use of a rather simple air-cooling arrangement.

In the higher air-velocity range, the data of Figs. 1 and 2 are not entirely consistent, for one shows a continuing increase in cooling with increasing air velocity while the other shows only minor increases beyond 600 feet per minute. This is not surprising, since they were obtained under widely different experimental conditions. It also may not be of great practical importance, since in our equipment the very high velocity range is accompanied by an intolerable amount of noise at the projector.

Measurement of Film Position

Before going on to discuss the problems of in-and-out of focus and the positioning of film in the aperture, the methods for determining this film position should be reviewed. In the original arti-

(Continued on page 26)

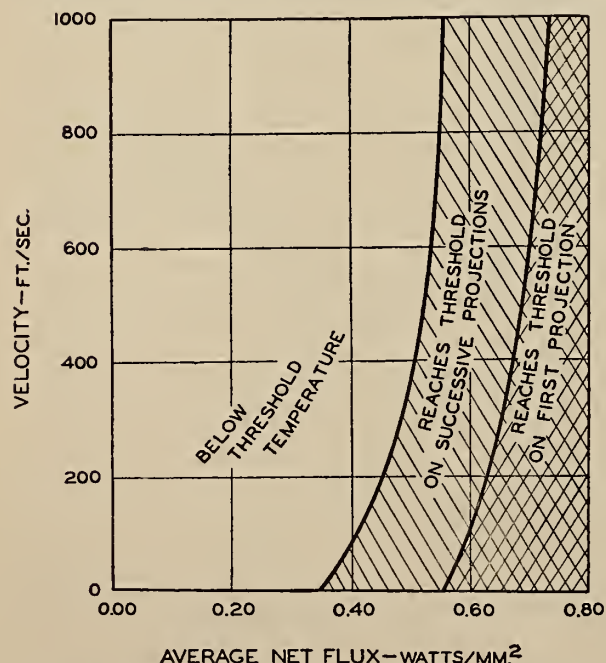


FIG. 2. Reduction in temperature of experimental film accomplished by high-velocity air. Graph shows number of projections of a loop of experimental film before it reached an unsafe temperature, and points out how much the region of normal behavior can be extended by air cooling.

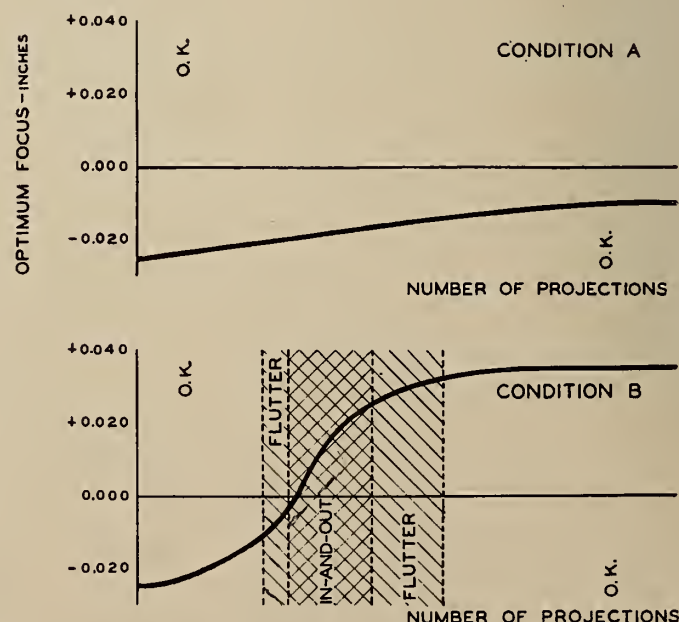


FIG. 3. Projection history of film as measured by changes in the point of best focus. If this point is determined for each projection of the film, the resulting curves can be related to film performance. This is particularly valuable for preliminary rapid testing to predict film behavior in the trade. A slow rate of change of focus, as in condition A, is typical of good screen quality; a rapid rate of change of focus, as in condition B, is always accompanied by poor image quality.

★ LOOKING BACK—TO THE FUTURE ★

This department, a regular IP feature, is a review of fundamental technical data.

The Language of Lighting

II. COLOR

COLOR is a pleasing visual experience which nature has used extensively to give variety and beauty to the landscape and the sky overhead. The brilliance of the flowers, the green of the trees, the radiance of the sunset, and the multicolors in the rainbow, all present a kaleidoscope to stimulate interest in color and to excite human ingenuity to duplicate it artificially, that this visual experience may be brought under man's control and applied wherever desired, day or night, independent of nature. To achieve this, in so far as it is possible to do so with light, one must, of course, know something of the theory of color.

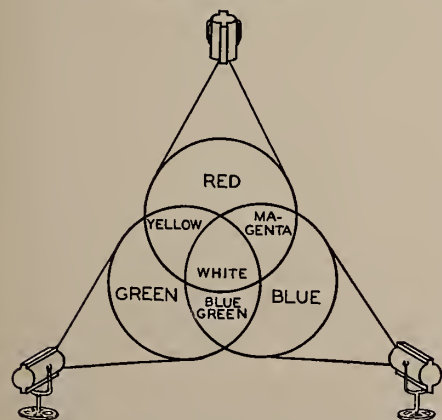
It is necessary, first of all, to become familiar with some of the fundamentals of color terminology. A color is characterized by three qualities—*hue*, *brilliance* and *saturation*.

Color Terminology

Hue. It has already been shown that hue, the fundamental quality of all colors, is determined by the frequency of the ether vibrations; thus hue is determined by the position in the spectrum and is identified as red, blue, etc.

Brilliance. A color of a certain hue may be dark or light. This has nothing to do with the frequency of the ether vibrations, but depends on the amount

FIG. 6. Color mixture by addition of wave-lengths of light.



of light reaching the retina of the eye in a given time. This characteristic of a color which causes it to appear as dark

or light is known as its *brilliance*, *luminosity* or *brightness*.

Saturation. If to a color of one wave-length—red, for example—white light consisting of all visible wave-lengths is gradually added, the red becomes paler and paler. In its original condition, this red is regarded as a pure color and is said to be perfectly saturated. It becomes less and less saturated as the white light is added.

Almost all colors seen in ordinary life are due to selective reflection of white light, and since some portion of all the wave-lengths is reflected, these colors are usually far from saturated. When a leaf is seen by sunlight, for example, it appears green because the leaf reflects the green wave-lengths more efficiently than any of the others. However, it does not completely absorb all other wave-lengths; nor does it reflect all the green.

It should be emphasized at this time that a color is by no means a simple elementary phenomenon but a complex psychological state, depending not only on whether the stimulating ether vibrations are long or short, or the level of the light high or low, but on many other factors as well. Among these might be mentioned the condition of the retina with respect to its previous stimulation (state of adaptation); the stimulation taking place in neighboring portions of the retina (contrast); the part of the retina being affected by the light, and the duration of the stimulus.

These factors combine to give rise to an almost endless variety of colors, equalled only by the variety of names which fashion experts, and others, find to attach to them. It is instructive to observe that in spite of all these complications, visual sensations are of such a nature that all colors, including white, can be produced by combining three properly selected primary colors according to certain laws of color mixing.

Color Mixing Methods

There are two methods of color mixing, the *additive* and *subtractive*. If on a screen a blue beam and a separate yellow beam of light are projected, the portion where they overlap will be white. These colors are, therefore, said to be complementary, and this method of com-

bining colored beams is called the *additive* method of color mixing.

The tendency in this method is always to produce more light and to approach white. The primary colors for the additive method are red, green, and blue. Red and green combine to give yellow and all the intermediate shades; red and blue give magenta, and green and blue give a blue-green. This method of color-mixing is illustrated in Fig. 1.

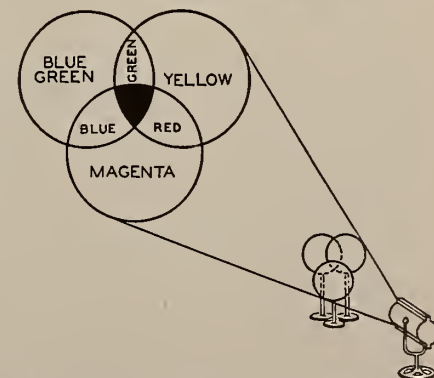
If a beam of white light is made to pass through a piece of yellow glass and a piece of blue-green glass placed behind one another, the light passing through will be seen as green. This is called *subtractive* color mixing, and the tendency in such cases is to obtain less light and to approach black.

The three primaries for subtractive mixture are the exact complements of those for the additive method. These are blue-green, magenta, and yellow (Fig. 2). They are approximately the blue, red, and yellow which are used in painting. Colored pigments, when mixed, behave according to the laws of subtractive mixture. In the application of light, wide use is found for both the additive and subtractive methods.

Producing Colored Light

Gaseous tubes are coming into wide use for the production of colored light. Filters which absorb all the colors except the one desired from an incandescent source are also widely used for this pur-

FIG. 7. Color mixture by subtraction of wave-lengths of light.



pose. For example, if red light is to be produced, white light is passed through a red-colored filter. Various substances are used for filters such as glass, gelatin,

(Continued on page 28)

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

PUBLICATION in the last and current issues of IP of a list of those men who have served their local unions for 25 years and more brings to mind again one of our pet projects—that of rendering simple justice to such long-term union officials. The talk on all sides these days is for some form of security for projectionists working in theaters, and we have strongly endorsed such agreements. But what of the man who for a quarter of a century and more has served these very projectionists who are so pension-conscious?

The Loew and RKO circuits, along with many smaller combinations and independent one-theater operators, have instituted pension plans which provide a degree of security for projectionists who have worked 20 or 25 years with the company. This is all to the good, and we're for it—all out. But what of the man who works for the *union itself*? Is he to be deprived of the very benefits which he works so long and hard to obtain for his members?

There is another very important angle to this matter. It is not outside the realm of possibility that a union official may serve his men for a score of years only to be defeated in a given election. We all have seen this happen—and sometimes the unsuccessful candidate is not even given a good projection job.

We say that charity properly begins at home, among our own people, and surely is this true within a labor union. We repeat: let's take care of our long-term union officials not only as an act of simple justice but as a potent reminder to all employers that security should extend to all.

- An all-out effort is being made by the entire motion picture industry to repeal the 20% Federal tax on theater admissions. President Walsh has pledged the support of the entire IA in this drive and has sent letters to all Local Unions urging the members to cooperate with the various committees in their communities. "The 20% tax is seriously hurting the box office," said Walsh. "The public, with leaner purse, now resents the tax and is limiting its movie-going. Relief from the tax will surely help theater business; and whatever helps the box office helps the men and women who work in the industry. Every IA member has a personal stake in this fight."

Incidentally, Walsh was named to serve as a member of the National Labor Committee of the 1950 Heart Campaign.

- Refreshments, buffet and music marked the opening last month of Neumade Products Corp.'s new headquarters in the McGraw-Hill Bldg., New York City.

Oscar Neu, head of the organization, is one of the most genial hosts it has been our pleasure to meet, and he spared no effort to make this shindig one long to be remembered.

- Nate Golden, member of Cleveland Local 160 for more than three decades, and head of the motion picture section of the U. S. Department of Commerce, was named chairman of the membership committee of Variety Tent No. 11, Washington, D. C.

- Tragedy stalked the projection room of the State Theater in Harrisburg, Penna., when two of its projectionists, both members of Local 488, died within a few days of each other. Several weeks ago Charlie Reed, member of the Local executive board, attended the funeral of Jim Leone, and shortly after reporting for work that same day was fatally stricken with an attack of coronary occlusion. Charlie and Jim worked on opposite shifts and relieved each other.

- George F. Raaflaub, secretary of Local 376, Syracuse, N. Y., finally made the Shrine and is now a full-fledged member of Tigris Temple of Syracuse.

- More than 500 members attended the February meeting of Chicago Local 110 and unanimously re-elected all officers of the present administration, with the exception of its business representative, who was re-elected in 1948 for a five-year term. The terms of all other offices expired after a two-year period.

Gene Atkinson, business representative, was given unanimous votes of confidence and of thanks for his splendid work in bringing Local 110 to the forefront as one of the most progressive Local Unions in the Alliance. The Local 110 welfare plan, entirely employer-contributed, has been hailed throughout the IA as a pacesetter for other Local Unions.

- R. H. McCullough, supervisor of theater construction for National Theaters, spent several days in New York recently on his way to Israel and Egypt, where he will conduct a survey on theater building

GROUP PICTURE TAKEN AT TMA BROOKLYN LODGE NO. 30 INSTALLATION OF OFFICERS



Front row (l. to r.): Mae Wallach; Sylvia Scheiner; Sam Nichenholtz; Ben Norton, president of Lodge 30; Philip Hitter, Grand secretary-treasurer; W. W. Friedman, Grand trustee. Back row (l. to r.): Reg Wallach; Harry Bluming; Joe Scheiner; Rose Hitter; Harry Axelrod; Mitchell Faber; M. Katz; Sylvia Katz; Gus Michaels; J. Axelrod; Irene and Max Lepson.



A diversity of activities, a community of interests (l. to r.): Jim Finn, Harry Shermom, of IP; Cecil Wood, pioneer projectionist and past president of 25-30 Club; A. J. Rodemocher, Altec Service Corp., and Arthur Meyer, general sales manager for International Projector Corp.

conditions in the Far East. McCullough has been a member of Los Angeles Local 150 for many years.

- Morris Rotker, member of New York Local 306, recently became a grandpop for the sixth time. Getting to be a habit, it seems.

- One of the highlights of the 58th anniversary celebration of Philadelphia Local 8 was the presentation of a gold life membership card to Mike Sweeney, popular secretary-treasurer of the Local. IA President Walsh, as guest of honor, made the presentation.

- Last month we commented on the fine Christmas spirit shown by the members of Local 364, Akron, Ohio, in sending a \$50 check to the widow of Bill Elliott, former IA president. In some inexplicable manner, we listed Local 364 as being in Toledo instead of Akron, an error for which we hope our friends in Akron will forgive us.

- Harry Blumberg, president of the Blumberg Bros. Theater Supply Co. in Philadelphia, is recuperating from a recent operation. Harry, a member of Philadelphia Local 307 for about 35 years, is extremely popular with the boys.

- In recent elections conducted by the National Labor Relations Board, wardrobe attendants in both CBS and NBC TV studios in New York City voted unanimously, in separate elections, for IA Local 764 to act as their collective bargaining agent. Local 764 also represents the wardrobe attendants with all Broadway shows and with companies touring out of New York City.

- Z. A. Sax, business representative for Local 159, Portland, Ore., is an amateur radio operator working from station W7FJZ in Portland, and spends a great deal of his leisure time in contacting

other hams throughout the country. Several weeks ago we received a telephone call from the operator at station W2OWL, New York City, who, in turn, was in direct contact with Sax in Portland. We could hear messages being relayed from one station to the other and we got quite a bang listening to this cross-country conversation.

- **TMA Jottings:** The recent 85th annual party of New York Lodge No. 1 was highlighted by the presentation of a solid gold life membership card to IA President Walsh. . . . Last month Grand President William R. Noon, assisted by Grand Secretary-Treasurer Philip Hitter, installed the newly-elected officers of Brooklyn Lodge No. 30. The outgoing president, Joseph Scheiner, was presented with a diamond-studded TMA pin. . . . January 23 marked the installation of officers for Long Island Lodge No. 67. Former president Nat Nadel was presented with a gold TMA ring. Grand Secretary-Treasurer Hitter and Grand Trustee Alfred W. Fried obligated the officers. . . . Frank Galluzzo, president of Chicago Lodge No. 4, was prevailed upon by acclamation to serve his sixth consecutive term as president. . . . A. G. Bartlett, for many years recording-secretary of San Francisco Lodge No. 21, died recently. He was succeeded by William P. Sutherland, who is also a deputy Grand president of the Grand Lodge.

- Among the recent out-of-town visitors to the offices of IP: H. Paul Shay, Local 289, Elmira, N. Y.; George Raaflaub, Harry Burley, and Louis Boyd, Syracuse

Local 376; and Bill Kunzmann, National Carbon Company roving ambassador of goodwill.

- The restoration recently of full autonomy to St. Louis Stagehands Local 6 ended three years of emergency control by the International Alliance. This was in accordance with a decision reached at the mid-summer meeting of the General Executive Board held in Denver, Colo. Frank Stickling, IA representative in charge of the Local's affairs during the emergency control, reported that it was in sound financial condition. An election of officers (reported elsewhere in this issue) was held under the auspices of IA President Walsh, who stated ". . . the affairs of Local 6 are in good shape, wage increases have been negotiated, and contract terms are being observed."

- Several years ago we suggested in these columns that theater employes be permitted to observe Christmas eve in their own homes. We were gratified to learn recently that Clyde Cooley, secretary of Omaha Local 343, did make such a suggestion to the exhibitors in his jurisdiction, stressing the fact that theater attendance on this night is generally poor. Several exhibitors fell in line with Cooley's plan and closed their theaters on this holiday eve. This is just a beginning, and we hope that many more exhibitors throughout the country will follow suit.

- As we promised last month, here is a continuation of the list of IA men who
(Continued on page 30)

LOCAL 395, ANN ARBOR, MICHIGAN, CELEBRATES ITS 35TH ANNIVERSARY



A dinner dance, attended by the entire membership and representatives from many sister Locals, marked the 35th anniversary celebration of Ann Arbor Local 395. Gold life membership cords were awarded to the two remaining charter members, J. Fred Summers (second from left in above picture) and Lowell Hutchinson (center), president and vice-president, respectively, of the Local.

Also seen on the picture above are (left to right): Clyde Adler, president of the Michigan Alliance and of Detroit Local 38, who made the presentations; Summers; Roger M. Kennedy, 5th IA vice-president and business representative, Detroit Local 199; Jerry Bric, business representative, Detroit Local 38; Hutchinson; Howard Fanslow, secretary, Local 395; Earl Ramsey, vice-president, Michigan Alliance and business representative, Jackson Local 172; Elmer Reichenacker and Clarence Purdy, treasurer and business representative, respectively, Local 395.

PEOPLE are intrigued by parlor magic and simple phenomena; they like to know the answers to things that they may have observed but do not understand. This human characteristic presents a real opportunity to the man interested in the science of optics, because there are many simple stunts which serve to demonstrate some point of optical significance.

Of course, we have constant evidence of nature's optical magic. The stick that seems to bend in a pool of water, the color in the rainbow or sunset, the brilliant gleam of a diamond, the shimmer of heat waves on a highway, the iridescence of oil on water—all are demonstrations of basic optical principles.

But let's consider in particular some of the optical parlor tricks that can be performed with readily available accessories. Not one of them is new or

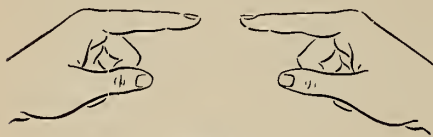


FIGURE 1.

original. But all are useful as conversational spark plugs. All are worthy of review by our readers.

Stereoscopic Vision

Few people realize the importance of binocular vision in determining depth or distance. But it's easy to show them. Try asking your friend to hold his arms out with elbows slightly bent. Ask him to close one eye and to try to bring

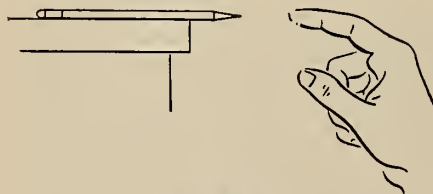


FIGURE 2.

the tips of his index fingers together, as in Fig. 1. Most people will miss by a half inch or more on the first try.

If that seems too easy, because of muscular co-ordination, here is an alternative. Lay a pencil on a desk or table so that its point extends beyond the edge, as in Fig. 2. Again, with one eye closed, have him try to touch the point with the tip of the finger. Not so easy!

The Dominant Eye

Point your finger or hold up a pencil so that it is in line with a distant object, as in Fig. 3. Now close one eye, then the other. It will be readily seen that the dominant eye (usually the right) has been used in sighting the distant object.

"But I can't line it up," someone will

Optical Oddities

By MILTON C. WILLIAMSON

Bausch & Lomb Optical Company

say, "because I seem to see two pencils when I look at a distant object." Then, let him try this. Tear a hole about the size of a nickel in a piece of paper and hold the paper at arm's length, fixing on some distant point. Have him move the paper slowly toward his face until it touches his nose. There's his dominant eye—looking right through the hole.

Pinhole Performance

Probably the pinhole is the simplest optical device in the world. A competent photographer can use it instead of a lens to obtain an excellent picture. And you can use a pinhole to point out fundamental optical truths.

Punch a pinhole in a card and have someone hold it close to his eye. Then ask him to hold his finger or some small object in front of the pinhole. Show him how he has achieved "universal depths of focus"—sharpness near and far at the same time.

While we know that some of our professional friends avoid a comparison of the eye and the camera, this phenomenon can best be explained in photographic terms.

Make a sketch of Fig. 4. Explain that the top illustration represents a photographic lens at full aperture. Points A and B are "circles of confusion," $1/100''$ in diameter, between which all images appear sharp. Now "stop down" the lens to a small opening as in the lower il-

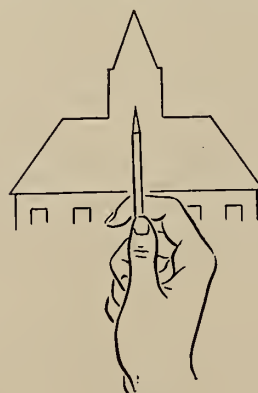


FIGURE 3

lustration. Points A and B move away from the focal plane. Objects over a

greater range (near to far) become sharp—the depth of focus has been increased.

Having demonstrated these principles, describe how a pinhole diaphragm in a camera or before the eye will result in almost universal depth of focus. With a bright light, even a presbyope (far-sighted) can read a telephone book through a pinhole.

This experiment helps to explain the action of the diaphragm in the human eye. As you know, a person who is mildly presbyopic may be able to read a newspaper at arm's length under ordinary lighting. However, if he holds his paper in direct sunlight, he will find that he can read it with ease at a shorter distance. When the bright light causes the diaphragm to contract, the result is greater depth of focus, which helps to overcome limited accommodation.

Now hold a pinhead close to the eye and between the iris and the pinhole. A shadow is cast upon the retina right side up. The pin appears to the viewer to be upside down, a beautiful demonstration of the remarkable mental and

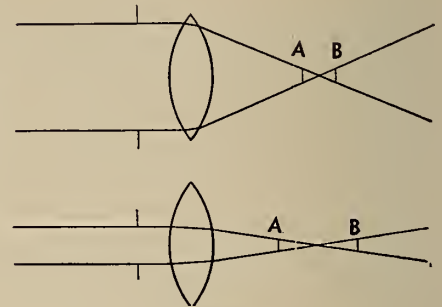


FIGURE 4.

psychological processes by which retinal images are inverted!

The Blind Spot

All of our ophthalmic friends are familiar with this demonstration, which we are including only by way of reminder. Mark two black dots on a piece of paper, as in Fig. 5. With the left eye closed, hold the card in line with the right eye. Watching the left dot, move the card slowly toward the face and observe there is one position in which the right dot disappears from the indirect field. You know the explanation—the second dot disappears when its image strikes the physiological blind spot.

As a more dramatic experiment, try to blot the moon from the sky: "B" represents the moon, "A" the point you must find to bring the image of the moon in coincidence with the blind spot.

Fun with Mirrors

A person seldom sees himself in a mirror as he really is. When he parts his hair on the left, the guy behind the



FIGURE 5.

glass insists in parting his on the right. But you can cure him of the habit.

Place two mirrors at right angles to each other, as in Fig. 6. Then, when the subject winks his right eye, his mirror image will do the same. If he looks at his left eye with both eyes, paths of light are as illustrated. Virtual image is at X. Seen with the eye that is looking at itself, the image will always be in line with the intersection of the mirrors.

If you want to confuse your friends thoroughly, try the experiment shown in Fig. 7. Mark four points on a piece of paper placed in front of a mirror. Hold a magazine or cardboard so that your victim can see only the reflected image. Then challenge him (or her) to draw the four sides of the square and the two diagonals. Any resemblance to straight

lines will be positively coincidental!

Retinal Fatigue

There are many demonstrations of retinal fatigue. The after-image caused by peering at a lighted bulb—particularly the bright light of a flash camera—shows how the visual purple of the retina is exhausted by intense light from a given source, how it takes an appreciable length of time for vision to return to normal.

Draw an intensely black figure on white paper—a cross, circle, or numeral will do. Have the subject gaze at it intently for 30 seconds, then look away at a dark background. As you know, the figure will be seen in reverse color. The

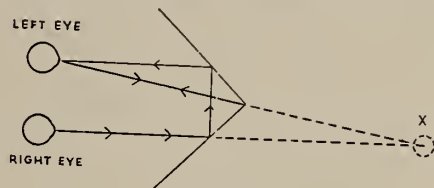


FIGURE 6.

after-image will be dark and can be observed most readily against a white background.



FIGURE 7.

This demonstration is effective in color. Of course, a bright blue spot will produce an orange after-image—its complementary color. A flashing red neon sign observed intently will result in a brilliant green after-image.

Well, there they are—a handful of optical oddities, some of which we hope will be new to some of our readers. If we have omitted your favorite demonstration of some simple optical law, write in and tell us about it. If we receive enough good suggestions, we will be glad to run a supplementary article in a later issue.

Tv Newsreel Production Technique

By JOHN SANDSTONE
Telenews Productions, Inc.

IN PRODUCING a newsreel for television, it is not surprising to find many standard newsreel procedures more than inadequate. Pioneering in new techniques necessitates a major shift in outlook—which shift is from polish to speed. While quality is by no means neglected, producing a daily newsreel for one-shot airings means amazingly close deadlines and pressures never experienced by theatrical newsreel people. Every operation, from camera work through editing and writing, all the way to distribution, must be performed at top speed.

The pressure is by no means eased when the film is finally delivered to the Tv outlet: transportation slowdowns or the press of late news may have delayed delivery until a minute or two before program time. Then the "heat" is definitely on the projectionist and the program director.

Mishaps Rare But Amusing

Theater projectionists being unused to this sort of thing, some amusing fouls-ups have resulted. One such incident occurred in Boston. Films of the 1948 baseball World's Series arrived on 16-mm silent film only a few minutes before broadcast time. A new projectionist hastily threaded the projector, without inspection. The results were amus-

ing but confusing: the first batter got a hit—and ran madly to *third* base! When the excitement subsided, a quick check revealed that the film had been threaded wrong-side-out, reversing the image.

One familiar with film processing problems—cutting, writing, editing, and shipping film in quantity—will appreciate the job involved in producing a daily newsreel. Advance and holdover stories are unknown. Each day represents a complete production cycle, starting with out-of-town and foreign stories picked up at the airport early in the morning, and local stories shot late the previous day. Complicated by stories arriving during the day, the job of putting together a newsreel goes on right up to the lab deadline. By nightfall a 10-minute reel is ready for telecast. Next day the same routine is repeated.

Illustrative of the high-speed coverage attained was a recent assignment to

Roosevelt, N. J. A camera crew left our New York office at 1 p.m., travelled 70 miles to Jersey, spent 30 minutes in shooting 400 feet of film, returned to the office—and at 7 p.m. that evening the cut and edited story was on the air.

A statistical analysis of the handling of such a story is of interest at this point. Research for the average 150-foot story (35-mm film) requires not more than 45 minutes; while most stories are researched in considerably less than 30 minutes—made possible by an extensive reference library and a highly-skilled staff.

High Speed the Essence

Research work is done while the film is in the lab being processed. Film developing time is 1 hour, 28 minutes; cutting and editing an 11½-minute silent story requires 22 minutes. A comparable story with sound is cut within 40 minutes. The finished story is then spotted on a viewer by an assigned writer, and 45 minutes later the script is ready.

The changes in standard procedure which make this speed possible are worth recounting. For more than two years none of our editors has seen a work print on a news story: there is never enough time to make one. Movie-clas are used only for the sound track: they are too slow for our editors, and they also may scratch the negative.

Original negative is merely run through a viewer, and after cutting is sometimes not even printed, going out

John
Sandstone,
Telenews
Cameraman.



to the Tv station before the patches are quite dry. When this happens, Tv engineers reverse the negative to positive electronically in the transmitter, and Tv viewers see an ordinary black-and-white image.

A standard newsreel camera is so designed as to shoot a few frames out sync. This is usually corrected in printing by moving the track the proper number of frames so as to match the picture. A simple process, this, but one which takes valuable time. *Telenews* uses Wall newsreel cameras, redesigned by us, to shoot in sync, thus reducing substantially the time needed for cutting stories, as the sound and the picture are always in sync.

One of the greatest obstacles to speed in our operations is transportation, with regard to both incoming film and outgoing finished reels. Stories arrive daily by air from every part of the world. Special arrangements with airlines, airports and customs authorities expedite these shipments, and motorcycle messengers are kept busy around the clock touring New York's airports.

Striking Contrast in Time

When aircraft are grounded we really start to work. Our film may be rerouted to a distant airport, or we may have to elect the comparatively slow-moving train. With speed of operations our constant concern, it is incongruous to realize that our precious cargo moving along in a train at 70 or 80 miles an hour will be delivered to viewers' homes at a transmission speed of 186,000 miles a second!

Close schedules require exactly close calculating. Films of the Rose Bowl football game, for example, are flown by helicopter from the Bowl to the Los Angeles airport. On numerous occasions a police escort speeds our film through crowded city streets. Films of the wedding of Mayor O'Dwyer of New York City were flown by chartered plane from Stuart, Fla., to Miami, just barely making connections.

During the World's Series, as an example, we face the problem of just plain mass. From two to three thousand feet of film per game, shot by as many as five different cameras, must be transported, edited and recorded in time to be on the air on the evening of the game. The film (35-mm) must be cut to about 200 feet in length and then reduced to 16-mm width, as many Tv stations have only the later gauge equipment.

To assist the lab people in such cases, the exposed film magazines are taken direct from the cameras and rushed to the lab by motorcycle at the end of the second, fifth and seventh innings. This prevents an otherwise huge pileup of film at the end of the game, since the sec-

tions are handled steadily through the afternoon as soon as it arrives. Thus the lab people can be working on innings one through five while the game still is in progress.

Widespread Print Distribution

While some newsreels receive network distribution, many Tv stations are not yet on coaxial cables and must be serviced with film prints. Located in widely scattered sections of the country, these stations represent a shipping problem too vast and complicated to bear recounting herein.

"Today's News Today" is the slogan of one Tv newsreel—and it and other reels make this slogan come true. Whether through ignorance or indifference, the miracles of achievement that lie beyonds the realization of this goal have been for too long taken for granted by a complaisant public demanding only to be entertained—and, for that matter, by those in the film trade not actually engaged in newsreel Tv work.

NEWS PROJECTIONS

Jottings of happenings which, while mostly of a non-technical nature, have a bearing upon general industry welfare and progress.

PROSPECTS for the repeal of the 20% admission tax dimmed considerably during the past month when, despite strenuous industry-wide efforts, including labor, no important legislative support rallied to support the film forces. President Truman failed to even mention the admission tax in his budget message to Congress. . . . Paramount's intermediate Tv system will be installed soon in the Radio City Theater, Minneapolis. . . . Exhibitor beefs fail to stop the re-

lease to Tv stations of a flood of films originally made for theater exhibition. . . . Gov. Dewey of N. Y. State announced that in the event Congress repeals the 20% admission tax, he will move to impose a similar levy for the N. Y. till.

CBS demonstration of color Tv recently deeply impressed many theater men who were present. Several exhibitors said the quality "approached" that of Technicolor. . . . Rex Theater, East Rutherford, N. J., petitioned Borough Council for permit to install burlesque policy, the reason given that Tv competition has become so severe that the house must switch its policy or close. . . . Studio employment in November dropped about 2% from previous month. Average weekly earnings for all classifications was pegged at \$97.16. . . . Every IA member has a "personal stake" in the fight for repeal of the 20% amusement tax, said IA Prexy Walsh, who urged close cooperation with exhibitor groups in the matter. . . . Dept. of Justice mulling move to begin antitrust action against Tv broadcasters and manufacturers because of "concerted action to delay, if not to prevent, advent of color Tv." . . . It is ridiculous to think that Tv does not hurt the movie box offices, declared Steve Broidy, Monogram Pictures president, who added: "It's fundamental that people can't be at home watching Tv and in the theater at the same time."

Four companies, all outside the film industry, reportedly bidding for Paramount's 560,000-share interest in Du Mont Television Laboratories. Asking price said to be \$10 million. . . . Average price for film theater admissions in 1949 was 47.1 cents, compared with 47.2-cent rate for 1948. . . . Paramount will make 30 feature pictures during 1950.

MANUFACTURING, SUPPLY COMPANY EXECUTIVES AT SIMPLEX X-L PROJECTOR DEBUT



Shown here (l. to r.) are L. B. La Rue, secretary, General Precision Equipment Corp.; R. B. Tompkins, president, International Projector Corp.; Walter E. Green, president, National-Simplex-Bludworth, Inc., and H. G. Place, president, General Precision Equipment Corp.

Ballantyne's 1950 Equipment Offered on Package Plan

During 1950 the Ballantyne Company, Omaha, Neb., will merchandise a complete new line of sound picture reproducing equipment: the model BW projector, which will be manufactured in conjunction with Wenzel Projector Corp., Chicago; the Hydro-Arc carbon arc lamp (two models) manufactured by C. S. Ashcraft Mfg. Co., New York; a high-power amplification system, and a complete line of in-car speakers.

All of these units will be offered under the inclusive Turn-Key contract whereby barren ground is transformed into a ready-to-operate drive-in theater, including every essential therefor.

The projector has a modern rear shutter and will accommodate the new large-diameter 4-inch lenses. A large, roomy film compartment makes for operating ease. Every part is of a standard type, obtainable at any supply house.

Two models of the Hydro-Arc lamp-house are available: one which is designed for 8-mm positive carbons, while the other accommodates the 9-mm posi-



Ballantyne projector which is manufactured in conjunction with Wenzel Projector Corp.

tive. Both lamps employ the non-rotating, horizontal arc, with water-cooled mechanisms and 15½-inch reflectors.

The amplifier is capable of delivering up to 400 watts, each unit being rated at 200 watts for normal operation, with the other being used as an emergency standby. The new speakers are patterned after the well-known Soundmaster line, of which Ballantyne reportedly has sold more than 100,000 units. The internal speaker cone is fully waterproof and the voice coil fully enclosed.

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\$300 **SERVICE**
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f/1.9
EVEN IN 7 INCH
FOCAL LENGTH!

for the
LATEST PROJECTORS!

The newest projectors can take larger lenses. Here is the lens designed specifically to achieve top performance with these modern projectors — the sensational four inch diameter Super Snaplite. Speed of f/1.9 from 5 through 7 inch focal lengths, in ¼ inch steps.

MORE LIGHT...the four inch diameter Super Snaplite gives you an f/1.9 lens in focal lengths as long as 7 inches!

LONG LIFE...one piece mount, specially sealed lens elements, anodized finish that can't flake off — all spell longer, top-notch performance for the four inch diameter Super Snaplite!

SHARPER PICTURES...a true anastigmat lens for longer throws — the four inch diameter Super Snaplite produces pictures wire-sharp right to the very corners!

HIGHER CONTRAST...anti-reflection coatings further enhance the brilliant, crisp, sparkling pictures projected by the four inch diameter Super Snaplite!

Four inch diameter Super Snaplites are available, to order, in focal lengths from five up through seven inches, in quarter inch steps. In all these focal lengths the true effective speed of f/1.9 is maintained. Four inch diameter Super Snaplites are also available, to special order, in focal lengths longer than seven inches, at somewhat slower speeds.



Get the full facts of this superlative new lens now—write for your copy of Bulletin No. 209 today!

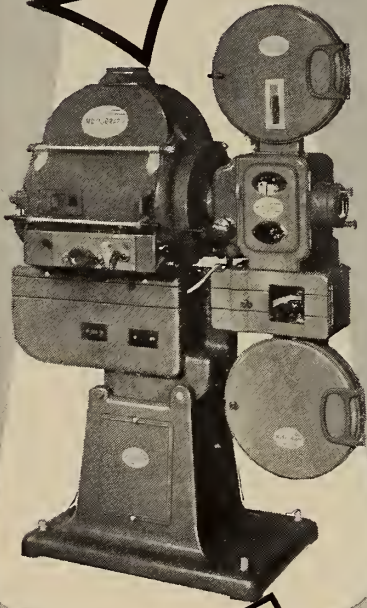
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FULL YEAR**

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Double Shutter Projectors are designed and built to operate longer without costly repairs and replacements and consequently have the lowest possible ultimate cost. They assure maximum screen illumination without flicker. Smooth, quiet, cool operation. Buy Motiograph; buy proven satisfaction. Order from your Motiograph dealer or write

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San Francisco 11, California

Air Cooling Motion Picture Film for Higher Illumination

(Continued from page 18)

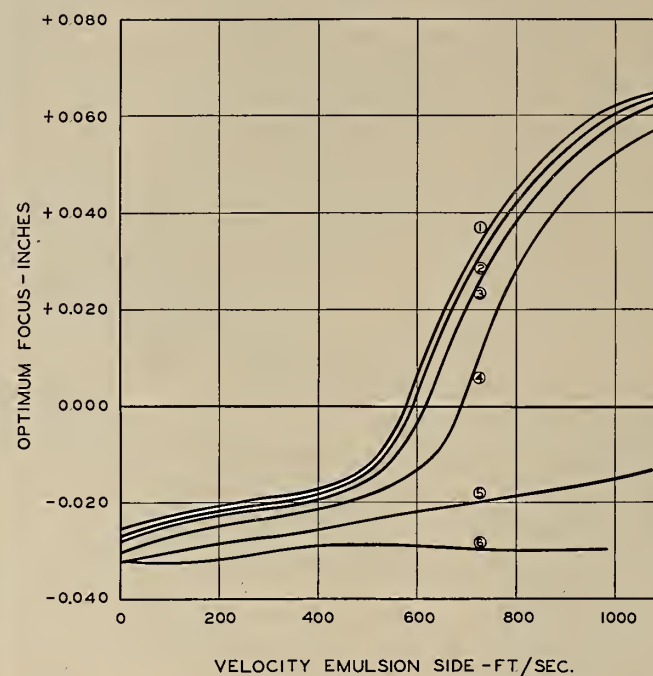
cle by Carver, Talbot, and Loomis¹ a method of observing film position was described depending upon a gauge indicating the motion of the projection lens with respect to a fixed point on the projector mechanism.

This system has been preserved essen-

hairs in the position that the image would occupy in film held perfectly flat in the gate.

Illumination is provided by a small headlight lamp, located in crater position so that the optical system of the lamp and projector is completely filled. When

FIG. 4. Mechanical film displacement as a function of air flow from nozzles. The 2 nozzles used in this experiment made an angle of about 30 degrees to the film plane, and in this position each tended to displace film in the direction of the air flow. The curves show the behavior of



freshly processed film without a previous projection history. Note that a resultant force capable of forcing film through zero, and even forcing it far positive, can be obtained if the emulsion-side nozzle sufficiently overpowers the base-side nozzle. Conversely, an overpowering base-side nozzle will hold firm in the desirable negative deflection.

tially unchanged, with the substitution only of a dial gauge for the lever gauge originally used. This dial gauge indicates motion of the lens with respect to the projector frame.

Calibration to relate these values to actual film displacement from a flat plane in the gate makes use of a ground-steel gauge block with a small hole in its center, which holds thin glass-fiber cross

the cross hairs are focused sharply on the screen, the gauge is set to zero.

The convention used in designating direction of film motion from this zero, it will be remembered, is to call motion toward the light source *negative* and motion toward the projection lens *positive*.

Maximum Drift Values

In the article it was pointed out that when the best visual focus is obtained upon the screen, the projection lens is actually focused upon the limit of film travel in the negative drift that is occur-

¹E. K. Carver, R. H. Talbot, and H. A. Loomis, "Effect of High-Intensity Arcs Upon 35-mm Film Projection," J. Soc. Mot. Pict. Eng., vol. 41, pp. 69-87; July, 1943.

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REFLECTOR

ALL METAL

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CEDAR GROVE, N. J.

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ring during the projection of each successive frame. Thus, the departures from ideal flatness in the gate that are indicated by measurements of film position with this technique are the maximum values for each frame.

Such measurements of film position provide one of the best methods of following those high-intensity projection effects which depend on previous projection history. If one plots the best visual focus for succeeding projections of the same film, relatively minor trends will be found if no image trouble is encountered.

A typical curve is that for condition A of Fig. 3. This represents normal negative drift, decreasing slightly with time; it may be accompanied by the appearance of embossing and change in reflected image tone.

If intensities are increased to a level that produces in-and-out of focus, however, a curve like that for condition B of Fig. 3 results. With successive projections, the focus position changes from negative to positive; as the zero position is approached, image flutter appears, and around zero, in-and-out of focus will be found. With successive projections, negative drift is completely replaced by positive drift, and the image quality improves.

Number-of-Runs Factor

During an accelerated laboratory test, in-and-out of focus may be encountered after 2 to 15 or more projections, and the subsequent improvement in image quality may come in from 2 to 10 projections additional. In a theater where generally longer times elapse between projections, in-and-out of focus may begin in several days to several weeks, and last correspondingly longer.

It is particularly convenient when comparing various projection conditions to study the changes in focal position during accelerated laboratory tests. A rapid focus drift from negative toward positive indicates early trouble in the theater and unsatisfactory projection conditions; a slow or negligible change indicates that no serious image difficulties should be encountered.

Mechanical Displacement of Film

It will be apparent from what has already been said about the negative drift of film in the aperture under normal intensities, and the in-and-out of focus combination of negative and positive drift at higher intensities, that film in the aperture under certain conditions can assume an equilibrium position anywhere over a range of approximately 0.100 inch.

It might be assumed from this that the mechanical force of an air jet impinging on the film could contribute to positioning the film somewhere in this range, and the experimental work showed indeed that film can be moved in the aper-

ture solely by the mechanical force of the impinging air jets.

Figure 4 presents a generalized picture of what the forces of air jets can contribute to displacement of film in normal projection.

The data for Fig. 4 were obtained during the projection of a roll of fresh film at normal intensities, where, if left to its own devices, without air impingement, the film would have taken an equilibrium position at approximately minus 0.026 inch.

With a series of air flows directed both

from the emulsion side and the base side of the film, it will be seen that this equilibrium position can be displaced to a maximum negative displacement of minus 0.035 inch and a maximum positive displacement of greater than +0.060 inch!

Balancing Drift Directions

With no air on the base side and air impinging only from the emulsion side, it will be seen that near the mid-point of the air-flow range the film was restrained from its normal negative drift to the ex-

IMPART REAL SPARKLE

to your presentations with
this more brilliant spot

THE STRONG TROUPER HIGH INTENSITY SPOTLIGHT



A portable A.C. Carbon arc that produces a steady, sharp, uniformly illuminated snow-white spot. Silvered glass reflector and two-element variable focal length lens system. Draws only 10 amperes from 110-volt A.C. convenience outlet. Adjustable, self-regulating transformer in base. Automatic arc control. Carbon trim burns 80 minutes. Horizontal masking control. Can be angled at 45 degrees in each direction. Color boomerang. Six slides. Ultra-violet filter holder. Mounted on casters. Easily disassembled for shipping.

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For any projection lamp,
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Brighter Pictures*

- More efficient!
- Burns longer, steadier!
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- 15% more light with same amperage!
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The last word in carbons! Helios BIO carbons achieve a "new high" in increased brilliant-white screen illumination—guaranteeing at least 15% more light with same amperage. For any size screen including drive-ins. Countless tests under various actual projection conditions prove Helios BIO carbons produce a more brilliant, more consistent, steadier, and more evenly distributed light over the entire area of the screen. The slower burning consumption rate definitely makes Helios BIO carbons the most economical on the market.

WRITE FOR DETAILS

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tent that it was held nearly flat in the aperture, and that further air on the emulsion side displaced the film toward the projection lens. The action of air on the emulsion side only in pushing film toward the projection lens can be counterbalanced by air directed on the base side.

It can be seen also from Fig. 4 that the high-velocity flow directed at the base side exerted enough force on the film so that in combination with the normal forces producing negative drift, it prevented the air on the emulsion side from blowing the film toward the lens; actually, the resultant forces produced a greater amount of negative drift than would have been normal in this film.

It must be realized that Fig. 4 represents *only* the effects of air forces on film which, without air, would have positioned around minus 0.026 inch; it does not give a definite answer about the effects of air forces on film which might be at a different stage in its projection life, and might tend of its own accord to focus nearer zero or on the positive side of the gate.

[To be Concluded]

THE LANGUAGE OF LIGHTING

(Continued from page 19)

lacquer, fabric and pigments. The choice of color media is determined by the manner in which they are to be used and the desired permanency of the installation.

In another method of producing colored light, fluorescent materials are used in conjunction with light sources such as the low-pressure mercury arc. With sources of this kind, it is possible to produce from 50 to 200 times as much light as can be obtained by filtering the light from an incandescent lamp.

At times it is important to reproduce the color quality of average daylight for purposes of proper identification or matching of colored objects. For example, it is usually desirable to see the daylight appearance of fabrics, even though they be viewed at night.

For reproducing daylight, a blue color filter may be used with an incandescent lamp, allowing the transmission of only the proper proportion of each wave band to give the desired color quality of the transmitted light. For approximate results, the daylight lamp or enclosing globes of blue glass may be used; but wherever accurate identification must be made, or if the results must be scientifically reproducible, special color filters must be used: they may be obtained commercially.

Psychology of Color

Despite an apparent relationship between color in both pigment and light and human behavior, definite scientific facts on the subject are few. The illu-

minating engineering profession has been hesitant about accepting as scientific theory certain interesting reactions which many observers have duplicated from time to time, but as yet not invariably enough to develop a definite psychology of color.

However, a review of these few investigated facts relative to color and its effects on human reactions should prove interesting to the illuminating engineer even though, as yet, they cannot be given the benediction of science.

Many investigations over a period of years have indicated a marked difference in color preference between men and women. Men prefer blue, and women red, when color in the abstract is involved, disassociated from current fashions and other factors that might prejudice the subject. Investigation shows, however, that the second choice for men is red; while that for women is blue; hence this preference is marked but not always definite.

Contrast and Variety

Both sexes, however, react favorably to bold colors and show definite preference for strong primary colors of great vividness when these again are disassociated from current fashions in dress or other factors likely to affect the selection. This fact is of great significance in advertising and decorating to attract attention and is another reason for the predominance of such colors in outdoor advertising, in addition to the advantage of their greater distance visibility when properly used.

It must be emphasized that in the foregoing section colored pigments alone

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Custom Screen

^{*}Patent applied for

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were considered, for when colored lighting is investigated, almost the exact opposite in preference of men and women is noted. Men like the warm colors of light, the yellows and ambers for instance; and women like the cold colors of the spectrum.

The theater and the displayman frequently make use of this knowledge in their efforts to influence people. Again it must be pointed out that this noted preference is with colored light in the abstract, and that in practice, contrast and variety are important factors in using color in a pleasing manner, regardless of the sex of the observers.

The use of the adjective "warm" to describe red, amber, and yellow light, and "cool" to designate blue, green, and bluish-white light, is very significant, for it is a matter of general observation that rooms lighted in the former colors give observers a definite feeling of bodily warmth; while rooms lighted in the latter colors "feel" cool.

These facts are frequently used in interior lighting, changes being made in the color lighting for winter and summer. Again the displayman would do well to follow suit, using light of a cool nature on refrigerator displays, and warm colors of light on bathing suits, by way of example.

Stimulation by Color

Moreover, yellow and amber tinted light is definitely stimulating and has been known to increase the pulse rate of the more emotional types of people; while bluish-white and other cool colors of light are restful and soothing, provided the color is not too strong and definite. Purple and violet light are depressing and uncomfortable to a marked degree.

In fact, the human race as a whole, men and women, do not like bold, vivid colors in lighting, regardless of the wavelength employed. They do like, however, tinted light; and in the future the color of the light will undoubtedly play an increasingly important part in the home, factory, and store, as well as in the theater and for display where already it is used extensively and to advantage.

Warner Bros. '49 Profit \$10½ Million

Warners in the year ended Aug. 31 had a net profit of \$10,466,534, equal to \$1.43 per common share, as compared with a net of \$11,837,253, in the previous year, equal to \$1.62 per share.

While gross receipts of Warners in the quarter ended Nov. 29 were lower than the comparable quarter of the previous year, operating costs and amortization charges were lower, and it is estimated that the net profit for the quarter will exceed the \$3,093,000 profit reported in the initial quarter of last year.

Tv's Effect on Sports Gate

Sharply divided opinion as to the effect of television on sports attractions was evidenced by statements issued recently by two noted sports leaders. Said Heinie Miller, prexy of the National Boxing Association:

"In areas where boxing is televised attendance has hit new lows, the curve downward depending upon the number of tele sets in use. In such boxing centers as San Francisco, Spokane, Montreal and other cities where there is no tele,

boxing's gate receipts have hit an all-time high.

But from owner Philip K. Wrigley of the Chicago Cubs baseball team came the following pronouncement: "We are confident that tele will bring baseball closer to vast numbers of Americans and will result eventually in bringing many more persons to the ball parks to get a close-up, personal view of the dramatic scenes and the colorful characters they become acquainted with on their tele screens."

NOW, for a few pennies a week per car station, you can be sure that all RCA in-car equipment in your Drive-In will operate at peak efficiency *all the time*.

Under this Plan, RCA Service Engineers check your installation regularly. They restore every speaker or junction box that fails during normal operation. They replace faulty speaker mechanisms and components with brand-new RCA units. If a speaker must be returned to an RCA Service Center for repairs, RCA furnishes the shipping container—and pays the transportation charges both ways. Repairs to spare speakers are included at no extra charge.

Available to every drive-in theatre equipped with RCA In-Car speakers and junction boxes, the RCA Sound Parts

Plan takes the worry, work, and unexpected expenses out of in-car equipment maintenance. Service is fast and efficient. Rates are surprisingly low—and can be arranged on a weekly or monthly "seasonal" basis to meet your needs.

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- Relieves you of the work and worry of keeping your in-car equipment operating all the time.
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IN THE SPOTLIGHT

(Continued from page 21)

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J. O. Bogardus, L. 291, Grand Rapids, Mich.

Ray Field, L. 472, Flint, Mich.

William Oleson, L. 620, Pontiac, Mich.

George Chalmers, L. 487, Eveleth, Minn.

Paul W. Schmidt, L. 443, Jefferson City, Mo.

Lew S. Smith, L. 240, Billings, Mont.

Charles Odenwald, L. 339, Missoula, Mont.

Edward Connelly, L. 116, Trenton, N. J.

John C. McDowell, L. 1, New York City.

Edward McGrath, L. 340, Nassau Co., N. Y.

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William B. Miller, L. 535, Johnstown, N. Y.

C. J. Ritchie, L. 178, Salisbury, N. C.

H. J. Cunningham, L. 278, Asheville, N. C.

A. Pakula, L. 603, Raleigh, N. C.

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J. Max Ealy, L. 378, Wichita Falls, Tex.

Frank M. Sutton, L. 550, Norfolk, Va.

George Beltz, L. 64, Wheeling, W. Va.

Edward L. Bradley, L. 271, Charleston, W. Va.

Ray Balliet, L. 251, Madison, Wis.

* The January meeting of the 25-30 Club was largely devoted to the installation of newly-elected officers by Morris Rotker, former president. Officers for 1950 are: Albert A. Kaye, pres.; Harry Mackler, vice-pres.; Benjamin Stern, fin.-sec.; M. I. Klapholz, rec. and corr.-sec.; Julius Wetzler, sgt.-at-arms; Harry Higgins, trustee (1950); John Krulish, trustee (1951); Tom Forestieri, trustee (1952). A floor show and refreshments followed the installation ceremonies.

The February meeting of the Club was held at the International Projector Corp. plant in Bloomfield, N. J., where

a demonstration of the new Simplex X-L projector was given. Needless to say, the IPC boys did everything possible to make this an eventful evening. Present at the demonstration, in addition to Club members, were many of the top-flight IPC and NTS executives.

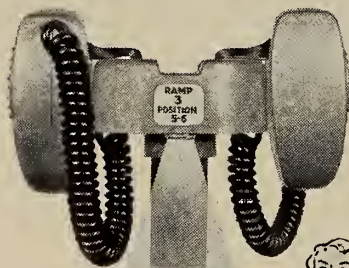
* One of our subscribers is very anxious to obtain back copies of IP in order to complete his files, and is willing to pay \$1 per copy for any of the following issues: November and December 1931; January, February, March, April, and May 1932. Please contact Anton F. Bruns, 10740 Woodbine St., Los Angeles 34, Calif.

IA ELECTIONS

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Theatre-Goers APPROVE and ACCLAIM SOUNDMASTER IN-A-CAR SPEAKERS



That's Why Over 280 Drive-ins
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This same popular speaker now offers several important improvements, yet is available at a lower cost than ever before. The deluxe speaker (above) with tinted plexi-glass ramp marking light in the junction box is also available. Glow-in-the-dark volume control knob is optional on all speakers at no extra cost. See it today at any Ballantyne Dealer, or write for details.

Ballantyne Drive-in Theatre equipment is available either in "packaged" combinations, "packaged priced" for any size drive-in, or, in the Ballantyne "Turn-Key" drive-in, the original plan for completely building and equipping a theatre at a low contract price.

THE BALLANTYNE CO. OMAHA, NEBR.

Star performance WITH STAR CORE*

Lorraine carbons

STAR CORE, exclusive feature with the Lorraine Carbons — a manufacturing process that increases the performance of the carbons.

A more brilliant, steadier, more consistent white light—more economically... proven facts as shown by tests made under actually operating conditions.

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*Featured in our horizontal-feed copper-coated carbons.

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LOCAL 105, LONDON, ONT., CANADA

H. McLean, *pres.*; T. Robertson, *vice-pres.*; W. Hewitt, *rec.-sec.*; C. Mills, *sec.-treas.*; J. McLeish, *bus. rep.* (*projectionists*); J. Garnett, *bus. rep.* (*stage hands*); C. Johnson, *sgt.-at-arms*; J. Allaster, R. Courtney, W. Hewitt, *trustees*; W. Shaw, M. Rehder, *auditors*; A. McLeish, S. Bradford, *exec. board*; C. Mills, S. Shaw, S. Bradford, *exam. board*; J. E. C. Saunders, *del. IA Convention*.

LOCAL 110, CHICAGO, ILL.

James J. Gorman, *pres.*; Frank Galluzzo, *vice-pres.*; Clarence A. Jalas, *sec.-treas.*; Julius Dickstein, *sgt.-at-arms*; George Karg, Claude Holmes, Edward Schulze, *trustees*; Charles Funk, Sam Klugman, Charles B. McNeill, Arthur Tuchman, *exec. board*; Eugene J. Atkinson, Howard Blackwood, William Campbell, J. Gorman, C. Jalas, S. Klugman, Joe Rossberger, and A. Tuchman, *del. IA Convention*.

All officers of the Local were unanimously re-elected. Atkinson, *bus. rep.*, re-elected in 1948 for five-year term.

LOCAL 143, ST. LOUIS, MO.

Tony Blust, *pres.*; Leonhard Michael, *vice-pres.*; Howard Flier, *rec.-sec.*; Herbert Butz, *fin.-sec.*; William Briley, *treas.*; Harvard O'Laughlin, *bus. rep.*; Basil Bickel, *sgt.-at-arms*; Elmer Wieser, *guide*; George Oonk, Sr., *trustee*; Earl Hobbs, Jr., Joe Schuller, Harry Jackson, *exec. board*; H. O'Laughlin, Leo Canavan, Emil Werner, Earl Del Porte, *del. IA Convention*; C. Fred Kelsick, Ray Fitzgerald, *del. Missouri State Fed. of Labor*; C. F. Kelsick, Ralph Robertson, *del. Central Trades Labor Union*.

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LOCAL 186, SPRINGFIELD, MASS.

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lee, Jr., Emilc A. Bessette, Benjamin G. Hull, Williamson, Payette, *del. Westfield Central Labor Union*; Payette and Williamson, *del. IA Convention*, with J. F. Gatelee, Jr., *alternate*.

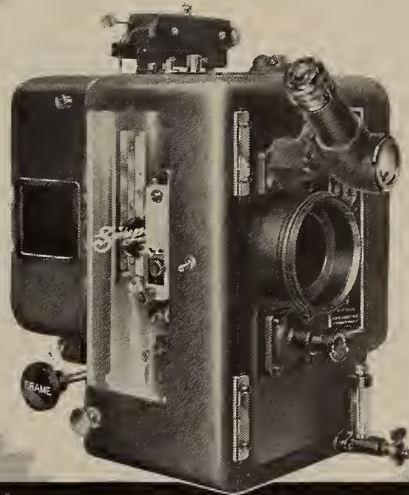
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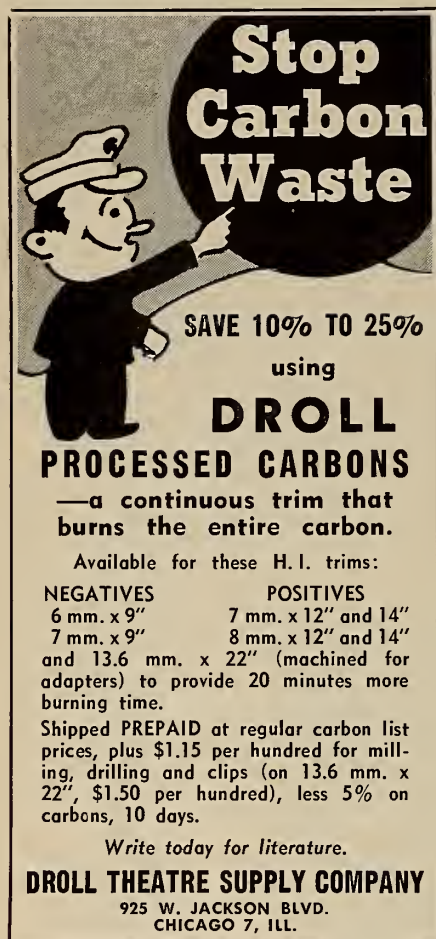
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THE 35-mm PROJECTION POSITIVE FILM

(Continued from page 9)

bustion, being somewhat retarded by the gelatine emulsion, may seem rather slow and unalarming. But appearances are sometimes treacherously deceptive. Not only is the blaze a chemical fire of almost unextinguishable intensity, but the partial "smothering" of the flames by the emulsion vastly increases the volume of poisonous and combustible gases evolved.

Film unwound in a loose pile—especially film from which the emulsion has been removed—burns with a searing, explosively violent flame. It is next to impossible to extinguish such a fire.

Ignition Temperature, Time

The temperature attained by burning nitrate film depends on conditions, and

hence varies greatly. An ample supply of air facilitates the combustion, thus increasing the temperature; and, naturally, a large mass of burning film makes a hotter fire than a small mass of film. A temperature in excess of 2,000° C. (3,600° F.) is probably produced when a 2,000-foot reel of film burns in a projector magazine. The production of heat amounts to approximately 18,000,000 gram-calories.⁵

A 2,000-foot roll of film requires from 20 seconds to about a minute to burn up completely, depending on the conditions. A blazing reel of film in a projector magazine is beyond control in about 5 seconds from the time of ignition; and it burns for about 45 seconds in the case of a 1,000-foot reel, and about 1 minute in the case of a 2,000-foot reel.

Analyses of Gases Evolved

It is difficult to give an exact analysis of the gases produced by burning nitrate film base. The presence of gelatine emulsion and the amount of air available have a profound influence upon the composition of the resulting fumes. But in every case the fumes are explosively combustible and poisonous.

When blank emulsion-free celluloid film burns in the total absence of air, the following analysis is obtained:

% by Volume

Carbon dioxide	14
Carbon monoxide	47
Hydrogen	18
Methane	15
Nitrogen oxides	1
Nitrogen	5

But if the film be unwound in a loose pile and burned with access to plenty of air, the analysis is somewhat as follows:

% by Volume

Carbon dioxide	55
Carbon monoxide	18
Hydrogen	2
Methane	8
Nitrogen oxides	15
Nitrogen	2

And rolls of film burning with only a moderate supply of oxygen give the following analysis:

% by Volume

Carbon dioxide	35
Carbon monoxide	40
Hydrogen	3
Methane	10
Nitrogen oxides	9
Nitrogen	2
Sulfur dioxide	1

Effect of Various Gases

The last of these analyses is especially important because it expresses the proportions of gaseous products arising

from the combustion of emulsion-coated film under average conditions.

It can be seen from these analyses that three combustible gases (carbon monoxide, hydrogen, and methane) and two highly poisonous products (carbon monoxide and such oxides of nitrogen as the dioxide and tetroxide) are generated.

The combustible constituents render the gas of burning nitrate film explosive when mixed with air within rather wide

limits. As a rule, any mixture of from 9% to 40% of the celluloid gases in air constitutes an *explosive mixture* which requires only a spark or flame to set it off.

As far as the poisonous gases are concerned, the nitrogen dioxide-tetroxide system is the most important. True, carbon monoxide will most certainly kill if breathed for a sufficient length of time, and even the non-poisonous constituents can cause death by suffocation;

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⁵ This corresponds to 1,800 kilogram-calories, or about 7,150 British thermal units per pound (200 feet) of film.

but the real danger lies in the presence of nitrogen dioxide and its polymer.

The maximum safe concentration is stated in Van Nostrand's Scientific Encyclopedia to be 0.04% in air by volume for carbon monoxide, and 0.003% for nitrogen dioxide (tetroxide). Nitric oxide is not involved in film fires, since the air immediately oxidizes it to nitrogen dioxide.

Innumerable cases are on record of projectionists being burned to death, asphyxiated, and fatally poisoned by exposing themselves to burning film and to the fumes thereby produced. The poisonous action of nitrogen dioxide is especially insidious in that the immediate effects may not indicate to the injured person that he is in grave danger. Several hours may elapse before the onset of the acute symptoms (extreme shortness of breath and weakness caused by the presence of nitric acid in the lungs and nitrates in the blood).

Suggested Course of Action

Alert projectionists have been known to *prevent* bad film fires by snatching the burning film from the upper fire valve before the flame can spread to the reel of film in the magazine; and occasionally we hear of some intrepid, but foolhardy, soul who is lucky enough to succeed in putting out a small film fire by squirting a carbon-dioxide extinguisher on the nascent conflagration.

Such attempts are permissible if—and *only* if—the projectionist actually *sees* the start of the blaze and allows himself no more than *five seconds* to extinguish the fire. If the fire is not out at the end of five seconds, not even the most heroic efforts will be of avail.

In practically every case of film fire, however, the projectionist is strongly urged not to attempt fighting the blaze. It is not his duty to do so; and enlightened fire officials recognize this fact by prohibiting fire extinguishers in projection rooms. In the event of fire the projectionist should:

1. Switch on the HOUSE LIGHTS.
2. Drop the PORT SHUTTERS.
3. GET OUT of the projection room.

Other emergency steps, such as closing the douser, shutting off the arc light, or stopping the projector motor, are comparatively unimportant. The projectionist's first duty in the event of fire is to protect his own person.

Acetate Film No Hazard

Acetate film (high-acetyl safety film) poses no fire hazard whatsoever. Safety film will burn in a feeble manner if the combustion is assisted by gently fanning the film; but as a rule a burning roll of safety film cannot be kept burning without the continuous application of heat from an external source.



Your Red Cross Needs Help —Give Generously

High-acetyl safety film contains no nitrogen, and it produces no poisonous nitrogen oxide when it burns. Without emulsion it burns about as paper does; but the emulsion-coated acetate film burns much less readily than paper. When nitrate films are completely replaced by prints on safety film, and the use of nitrate prints outlawed, there will be no reason in the world why any special fire precautions should be observed in the projection room.

During the period of transition from nitrate to acetate, however, projectionists and exchange workers must be on their guard against carelessness. All prints should be suspect unless known posi-

tively to be acetate film throughout their entire length. To quote a publication of Eastman Kodak Company:⁶

Identification of Film

"The manufacturers print their company name together with the words 'Safety Film' between the perforations and one edge of the film. This is not visible until the film is developed. Then it shows up in sharp black letters.

"Inexperienced people are often misled, however, because of the fact that in motion picture work images are transferred from one film to another. Thus the lettering that appeared on the negative film in black would appear on the positive in white. This makes it possible for the words 'Safety Film' actually to be printed on nitrate film.

"The one sure test is the burning test . . .

"A single frame should be cut from the roll. This piece of film should be taken to another room where there is no fire hazard. It should then be ignited with a match.

"Anyone familiar with the way nitrate film burns can immediately tell whether it is nitrate or acetate. Nitrate film burns fiercely; while acetate film burns quietly, and may even go out of itself. A glowing cigarette can burn a hole in acetate film without igniting it, while nitrate is almost always ignited."

[To be Continued]

⁶ "Questions and Answers on Safety Film"; IP for September 1949, p. 14.

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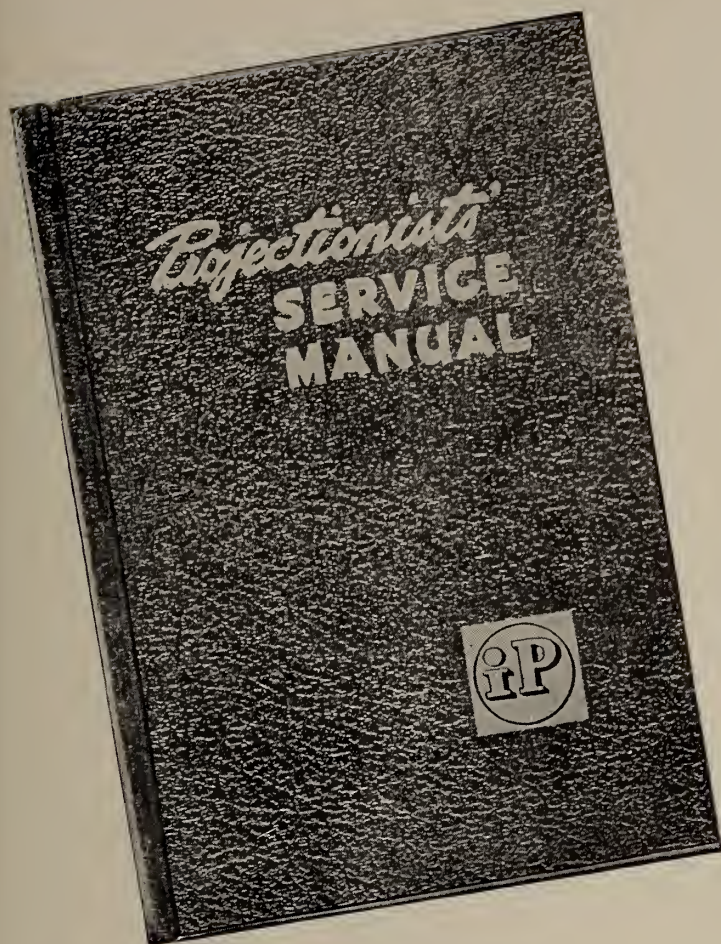
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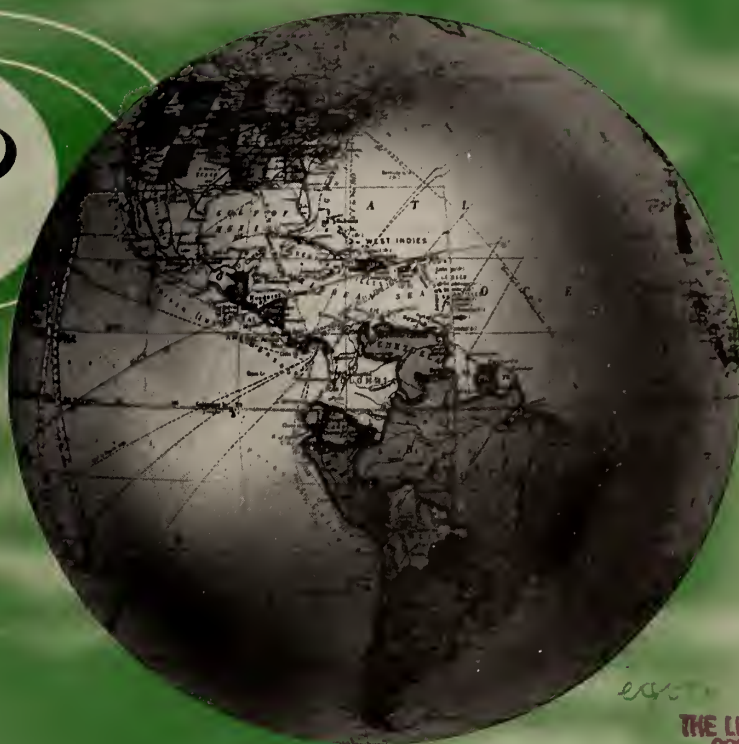
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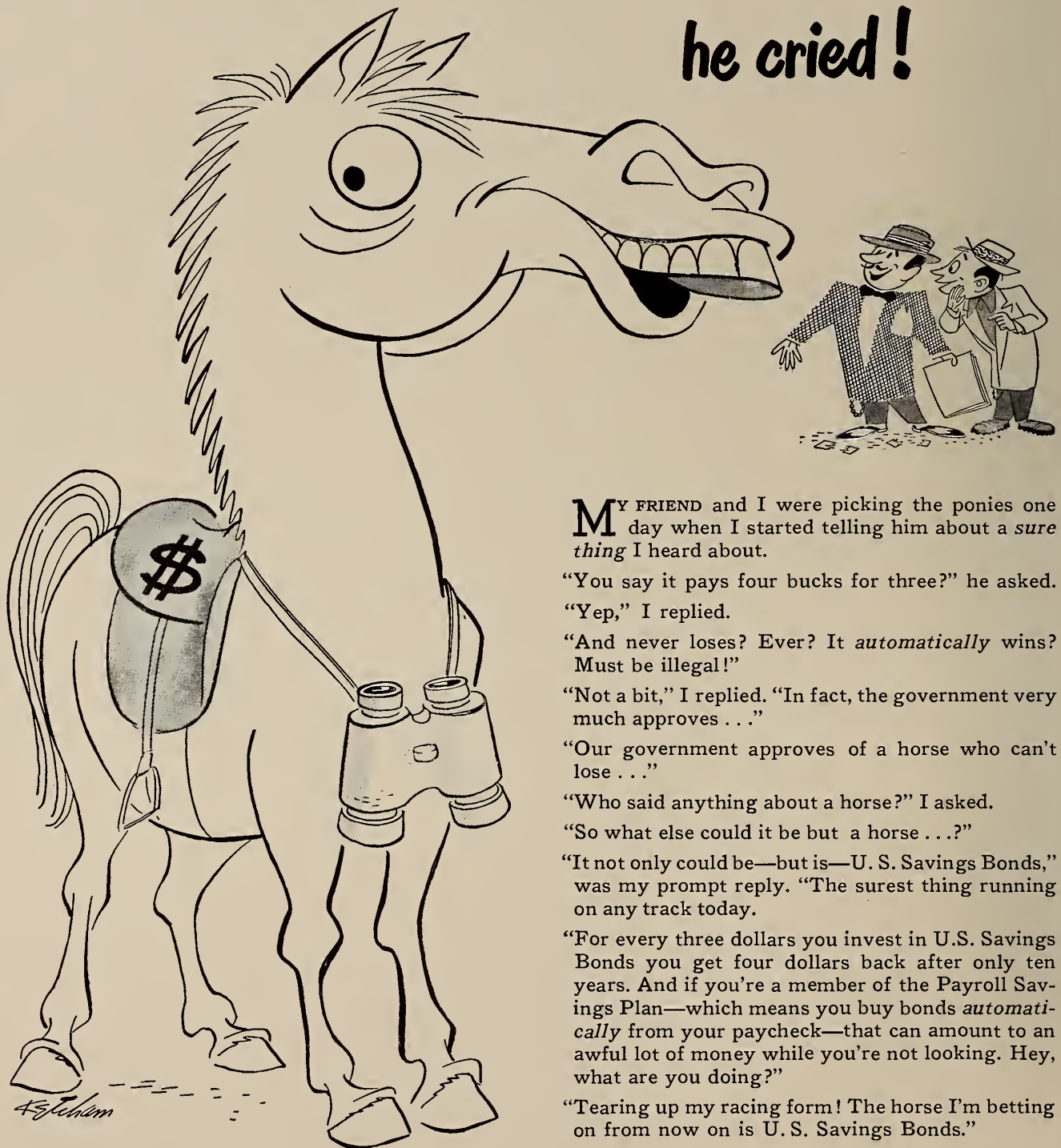
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"Yep," I replied.

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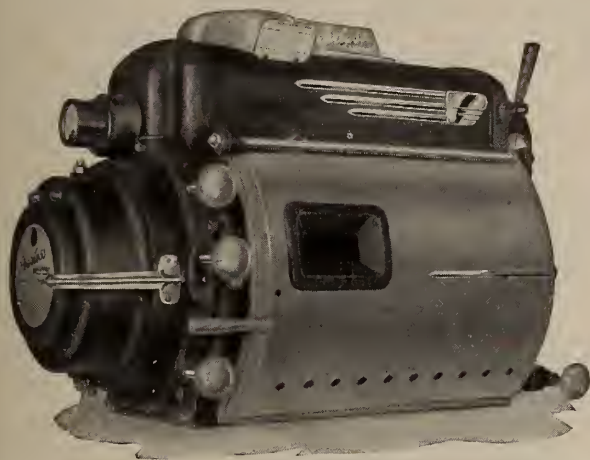
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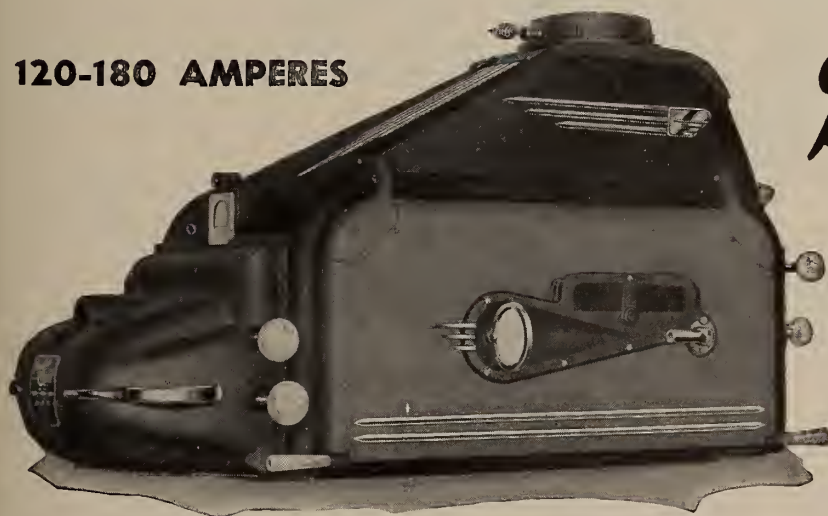


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HENRY B. SELLWOOD, *Editor*

Volume 25

MARCH 1950

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MONTHLY CHAT

IT'S getting to be an old refrain is this department, but the inescapable fact is that the passing of each month marks an ever-deepening penetration by television into the mass movie-going audience. No longer is the motion picture industry, and particularly the exhibition branch, whistling in the dark by means of airy pronouncements that while Tv has "dented" the theater audience it still is not a "serious" threat. These days film people openly acknowledge the ill effects of Tv, economically speaking, and not a few of the more outspoken industryites admit that the "dent" made by Tv has developed into a complete breakthrough of the order of from 15% up to as high as 40%.

Pointing up the attitude of the more far-seeing element in the film field is the recent move by Technicolor to acquire the Geer Tv tube for further development. This tube evidently is a vital element in the color Tv process, as attested to by the speed with which Technicolor moved to acquire it. "Further development" on this tube, says Technicolor, will entail an expenditure of \$250,000, which sum Technicolor regards as an insurance premium for the protection of their interests in the face of Tv's giant sweep forward.

No major studio has yet agreed to supply films for Tv outlets; but there are scores of independent producers turning out Tv films in profusion. Certain it is that, as a result of the apathy displayed by the theater field with respect to Tv, the major studios will soon decide to compartmentalize their operations, with one section producing for theater outlets, and the other for Tv stations. Such a move may be expected at any time now.

True, the FCC has announced that it will hold hearings soon on various aspects of Tv; but mere hearings, even if they result in a favorable decision for the theater field, will mean not a thing unless there is concerted action by *all* theater groups, including the labor forces, and an honest intent to back up such action by laying the dough on the line.

Have no fears for the future of Hollywood; that setup will endure by one means or another. One's real concern should be reserved for the theater field, its investment and its workers, both of which seem in imminent danger of being left in the lurch by an incredible display of ineptness on the part of the so-called leaders in the exhibition field.



He makes the most of moonlit moments . . .



IT'S mighty important to star . . . director . . . movie-goer . . . to have this moonlit moment come alive upon the screen.

And when it does—in all its subtlety of mood in light and shadow—the credit's due in no small measure to the important contribution of the laboratory control engineer.

For his knowledge of photochemistry, his "eye" for photographic quality . . .

his vigilant control of printing density and contrast . . . do much to make moonlight footage *look* like moonlight, and help to bring out the best in every frame of film.

Quality of film contributes, too; and this important assistance the laboratory control engineer is sure of when he works with the famous Eastman family of motion-picture films.

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The Geneva Intermittent Movement

THE Geneva intermittent movement is used in all modern theater projectors, although claw-type movements are used in studios for process work. The Geneva movement changes continuous rotary motion into an intermittent motion, the camshaft turning at a uniform speed, while the intermittent sprocket stands still part of the time and moves very rapidly the rest of the time. The intermittent must transport about eight inches of film a distance of $\frac{3}{4}$ of an inch at an *average* speed four times normal, and stop each frame in *exactly* the same position at the aperture.

When moving at a uniform speed (as it does on the upper sprocket) each frame is in motion four times as long as it is when in motion at the aperture. The

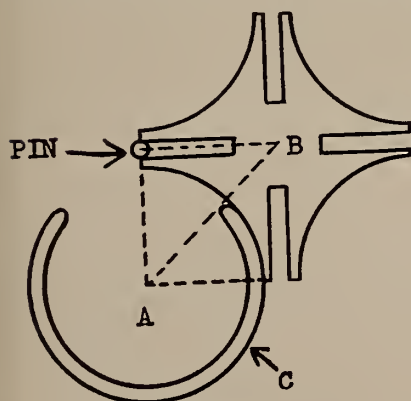


FIGURE 1

average film speed at the aperture is four times normal, or 360 feet per minute. Due to inertia, the film, the sprocket, and the intermittent shaft must be brought up to this speed gradually, consequently

By A. C. SCHROEDER

The first of a series of three authoritative articles on the "heart" of the professional motion picture projector.

the maximum speed must exceed 360.

In Fig. 1 the pin is shown at the instant it engages the slot in the star: exactly one-half the pin is in the slot. Until this moment the star has not moved. *A* represents the cam center and *B* the star center. *A*, the center of the pin, and *B* form a right-angle, as the dotted lines indicate. The arrow indicates the direction of the pin travel for an infinitesimal fraction of time at the exact moment it engages the slot. Notice that the pin travel coincides with the direction of the slot, consequently there still is no star movement.

This holds true only for the shortest possible moment, *immediately* following which the star begins to move very slowly, but the acceleration constantly increases until the cam has turned about 30 degrees. The speed of the star, and consequently the film, is still increasing even after 30 degrees of cam rotation, but the *rate* of acceleration has decreased.

Figure 2 shows the movement when the speed of the star is greatest but acceleration has stopped. The pin is in line with the shaft centers. *A* and *B*, and is comparatively close to *B*. For a *brief instant* the pin and the sides of the slot act nearly like gear teeth.

The radius of the corresponding large gear would be the distance *A* to the pin center; the radius of the corresponding

small gear being *B* to the pin center. Since the latter is much less than the former, the star is turning *at the rate* of many more revolutions per minute than the cam.

As the pin leaves the position of Fig. 2, the star, the sprocket, and the film begin to *decelerate*. This part of the cycle is as important as the first half. If the parts fit and are adjusted so that operation of the first half cycle is perfect, the conditions will also be correct for the last half. If the parts fit poorly, the tension shoes must decelerate not only the film but also the star, its shaft, and the sprocket, at least part of the time between the position of Fig. 2 and completion of the film transfer, thus putting an enormous load on the sprocket holes

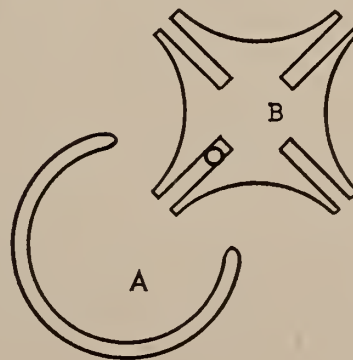


FIGURE 2

and preventing proper positioning of the film at the end of its travel.

The star, its shaft, and the sprocket, having attained such a high speed at the 45-degree position (Fig. 2) tend to main-

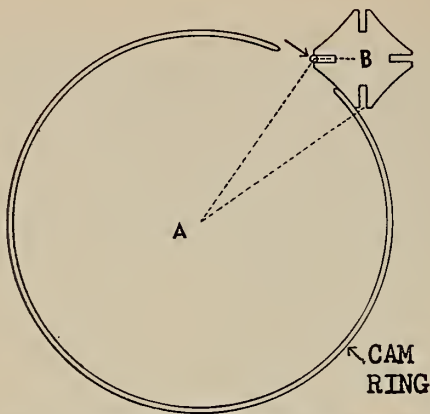


FIG. 3. Notice that radius on sides of this star is much greater than in Figs. 1 and 2; also that the slots are not so deep, due to large cam and the larger circle in which pin travels.

tain that speed, but the cam pin prevents this, forcing the star to gradually slow down. Immediately following the position of Fig. 2, the deceleration is low. The rate of deceleration then *increases* (remember the pin is decelerating the star all this time). The rate of deceleration *decreases* toward the end. The star is almost stationary when the pin is about to leave the slot.

The lock ring (C in Fig. 1) contacts the curved portion of the star snugly, thus holding it in position while the film is projected on the screen. The end of the lock ring is approximately at line A-B when the pin enters the slot. When the end of the ring is above this line, the star cannot move in either direction. As the pin proceeds farther into the slot, the end of the cam ring moves down and away from this line, allowing the star to turn, as Fig. 2 shows.

If the lock ring extends beyond the dotted line when the pin enters the slot, the star is still locked, while the pin exerts pressure on the star attempting to turn it, and the movement will not work. If the lock ring does not extend to the dotted line when the pin is the position of Fig. 1, the star is free to turn before the pin enters the slot, and the pin might strike the point of the star, thus wrecking the movement.

We can now study the possibilities of a faster movement. In the ordinary movement the cam and pin turn through 90 degrees while the star and sprocket move the film one frame. To increase the speed of the movement we must allow less than 90 degrees cam rotation to complete the star movement. The pin still enters and leaves the slot at the same two points, and to do this in less than 90 degrees the cam center must be farther away, decreasing the angle A, as shown by the dotted lines in Fig. 3.

The corresponding angle in Fig. 1 is 90 degrees. Notice how much smaller this angle is in Fig. 3. The arrow in Fig. 3 shows the direction of the pin travel as

it enters the slot. Notice that it does not correspond to the direction of the slot, as it did in Fig. 1, resulting in the pin contacting the slot with a bang, and the star *immediately* turns at a certain finite speed: a miniature collision occurs and the shock is transmitted to the film.

This extremely rough treatment soon shows not only on the film but on all the parts, including the cam pin. The larger the cam, with the same size star, the harder is the impact. If both the cam and star are larger, in proportion, there is no increase of speed, although the parts are more able to stand the strain imposed on them.

Another problem enters the picture when we increase the cam size. To illustrate this we make the drawing as though the cam were inordinately large in proportion to the star, as in Fig. 4: the three solid lines represent the side and end of the slot, the circle represents the pin, and the dotted line with the arrow at the end continues on to the cam center. The lock ring is not shown.

Arrow D indicates the direction of pin travel at this instant. Note that the pin just clears the upper edge of the slot; but E, which is closest to the lower edge of the slot, still is some distance away, as shown by the space between E and F. As the pin travels further it again *leaves* the upper edge of the slot and the distance E-F becomes less, until we reach the position in Fig. 5, showing the instant that contact occurs.

Arrow G indicates the direction of the pin and shows the point of contact. The distance between the pin and the upper edge of the slot has increased to H-I. The lowest extremity of the pin is now *below* the lower edge of the slot, as the

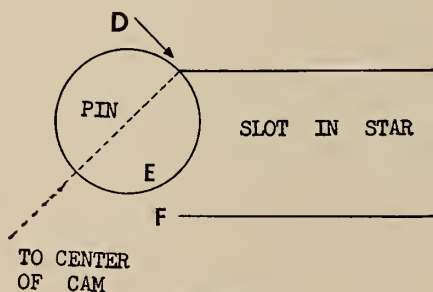


FIGURE 4

dotted line indicates. One might say that the pin has moved ahead of the star, so the star must snap ahead at a terrific speed, *instantly*, to make way for the pin.

Since the pin is positively-driven and cannot rebound, this impact causes the star to rebound, resulting in again opening a space at G. What occurs next depends upon the weight of the star and associated parts, the weight of the intermittently-moving portion of the film, and the friction due to the tension shoes. With heavy parts and light tension the star flies ahead until it "catches up" with

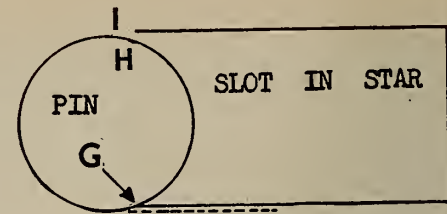


FIGURE 5

the pin, resulting in contact of H and I, with the possibility of another rebound here. The pin will now be far enough into the slot to prevent further erratic action, such as rebounding.

On the other hand, with very light parts and relatively heavy film tension, H and I will not touch; but the second contact occurs at G, where there is possibility of another rebound.

The degree to which the foregoing action takes place depends upon the speed of the movement. If the speed is only slightly above normal (3-to-1), rebound might not occur because of the lighter impact at G. The direction of arrow G would more nearly coincide with the direction of the slot. Also, the pin would be practically half way in the slot when contact occurs, thus stopping any tendency to rebound. However, there still is a sudden jar in any *conventional* movement where the speed has been increased beyond the 3-to-1 ratio, and the effects will be seen on the parts and the film.

In this discussion an intermittent in which the transfer of film is completed during a cam rotation of 90 degrees is termed a 3-to-1 movement. This same intermittent is sometimes spoken of as a 4-to-1 movement. This is apparently due to considering the ratio of the entire circle, 360 degrees, in relation to that part of the circle during which the pin is moving the star, or 90 degrees, which gives a ratio of 4-to-1.

The writer prefers to consider the ratio of that part of the cam rotation during which the star stands still, or 270 degrees, in relation to the part of the cam rotation during which the star moves, or 90 degrees, giving a ratio of 3-to-1.

[TO BE CONTINUED]

800 Million c.p. in Eveready N. Y. Sign

Some 800 million candlepower produced by a carbon arc contained in a giant flashlight features the new Eveready Beam which is the latest "spectacular" electric sign to be unveiled in the Times Square area of New York City. Unveiled on New Year's Eve, this gigantic ad display utilizes a flashlight tube 26 feet in length which, under favorable atmospheric conditions, pierces the heavens for 5 miles and is visible for as much as 100 miles encompassing an area of 31,000 square miles having a total population of 20 million people.

AIR COOLING

of Motion Picture Film for Higher Screen Illumination[†]

By F. J. KOLB, Jr.
Eastman Kodak Company

The third and concluding installment of this series of articles which detailed the steps necessary to effect efficient air cooling of the film.

IN DISCUSSING in-and-out of focus, it was pointed out that this phenomenon occurs when the best compromise film focus is near zero, permitting some frames to drift negatively and others to drift positively. Actually, in-and-out of focus has been produced in film under radiation conditions that normally do not result in in-and-out, by displacing the film with an air jet to bring its focal position near zero.

Thus, it becomes apparent that, for in-and-out of focus, air directed only at the emulsion side has two conflicting contributions:

- (1) it cools the film and by lowering the film temperature delays the onset of in-and-out of focus, and
- (2) it forces the film more nearly toward zero and therefore hastens the beginnings of in-and-out of focus.

In order to obtain the full benefit of the cooling action, it is necessary, therefore, to counterbalance the mechanical force of the air jet on the emulsion surface (where most of the film cooling must be accomplished) by directing a similar jet at the base side. The optimum procedure is to use sufficient air on the emulsion side materially to reduce film temperature, plus sufficient air on the base side to produce an unbalanced air force holding the film on the negative side of zero.

The combination of these two effects is more efficient than either one alone in permitting projection at higher radiation intensities.

The mechanical force holding the film negative and preventing its going in-and-out of focus must be applied before in-and-out of focus is actually experienced. Our experiments have shown that such a counterbalancing force can be quite effective in delaying in-and-out of focus or

in preventing it entirely if the projection circumstances are proper. However, it has less influence in correcting in-and-out of focus once it has occurred.

Projection Lens Design

In this connection it is important to mention the relationship between film position and uniformity of focus on the screen. Most projection lenses are designed so that the image surface is not truly a plane but is a curved surface concave toward the projection lens. Therefore, film which is positioned in such a surface concave toward the projection lens can be imaged sharply over the entire picture area.

Film whose curvature is greater than that of the image surface, or film that is convex toward the projection lens (and therefore contrary to the image surface) cannot be focused sharply over the entire picture area. A compromise must be taken, focusing part of the image and leaving the rest unsharp. It is fortunate,

therefore, that the best film performance is obtained with film restrained on the negative side of zero—since in this position it lies in a curved surface concave toward the projection lens and in best agreement with the image surface of the lens.

If projection conditions are chosen that permit the film to assume a surface convex toward the projection lens—even though the steadiness and image quality are adequate—it will be found that the best definition extends over so small a portion of the entire picture area as to be unacceptable in most circumstances.

Results of Air Cooling

In the latter part of this paper we have described the results of a series of experiments aimed at increasing the safe maximum projection intensity, and permitting an increase in screen illumination without loss in image quality or damage to the film. Such an advance has been made possible through use of high-velocity air in what for simplicity has been called "air cooling," although from the discussion it has been apparent that this is actually a matter of both cooling and positioning.

These improvements have been discussed in a more or less general way so far, and a summary of what they mean in the theater may be gathered from Table II. These figures have been called "probable limits" because it will take considerable practical experience to determine what is the maximum limit for air cooling without encountering difficulties in the theater. Therefore, Table II may be said to present three levels of illumination:

(A) the present maximum, (B) a readily obtainable increase, and (C) the probable maximum with air cooling alone, subject to more detailed confirmation.

From our experiments on air cooling, we are certain that condition B should be

TABLE II. PROBABLE LIMITS FOR SATISFACTORY FILM PROJECTION
STANDARD 35-MM THEATER PROJECTION

	(A) No Air Cooling	(B) Moderate Air Cooling	(C) Maximum Air Cooling
OUTPUT:			
Mean net radiant flux, watts/mm ²	0.45*	0.58	0.74
Screen lumens			
No shutter	17,000*	22,000	27,000
50% shutter	8,500*	11,000	13,500
Per Cent Light Increase	0	29	59
SOURCE:			
High-speed condenser-type lamp			
Positive diameter	13.6-mm		13.6-mm
Amperage	170		265
Heat-absorbing glass	1.2-mm Aklo*		None

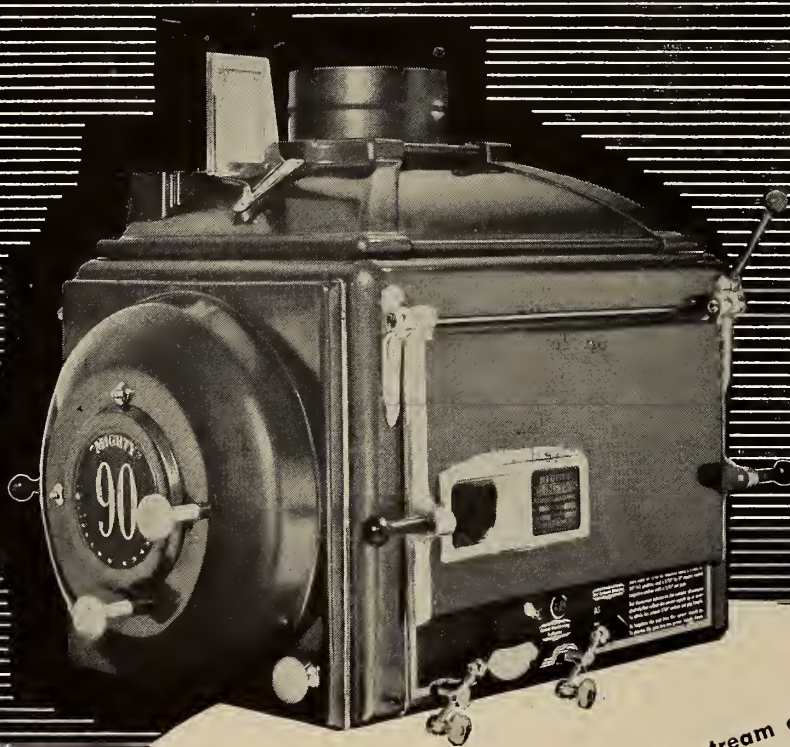
* Heat-absorbing glass is necessary to reduce the radiant output of this trim to a value that is safe for film without air cooling. These light and energy values were measured with the glass in place.

[†] J. Soc. Mot. Pict. Eng., Dec., 1949.

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STRONG MIGHTY '90'

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**PROJECTS A TRE-
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OF LIGHT. 21,000
LUMENS AT 90 AM-
PERES, MORE THAN
REQUIRED FOR THE
LARGEST SCREEN.**

Forced air cooled feed mechanism.
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Lightronic Tube controls both carbon
feed motors. Simple feed rate adjust-
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Big 16½ inch reflector matches high
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Air stream arc stabilization.
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[] I would like a demonstration of the Strong Mighty "90" in my theatre,
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capable of realization at this time. The result would be an increase of approximately 30% in available screen illumination with no increase in film difficulties or the demands made upon film.

It appears from the work so far that condition *C*, an increase of approximately 60% could be obtained by efficient utilization of the information we have herein presented, and we have successfully obtained such an increase with no film difficulties in excess of those normally found under condition *A*. At this upper limit, however, the increase can be obtained with safety only through careful attention to the details of the cooling system.

Some Limitations of System

Throughout this discussion, little mention has been made of noise from air cooling, which is quite variable, depending upon the design of the nozzles, their location in the projector, the design of the projector itself, and even the source of compressed air.

In our equipment, the air necessary for condition *B* can be applied with the noise of the air itself less than the normal operating noise of the projector. The air necessary for condition *C* in our equipment produces a noise level that is on the borderline approximately equaling the projector noise. If one attempts to use air in excess of this amount, however, the noise level increases rapidly and, as pointed out previously, the increase in cooling is slight.

Additional drawbacks of this system are that a source of low-pressure air must be provided, that an additional control must be operated, that for optimum results in most cases a new projector design would be desirable (specifically planned to provide proper air nozzles, and so forth), and that at the higher ranges some safety provision must be incorporated to prevent damaging the film if the cooling air should fail during operation.

Suggested Projector Changes

We believe that the most practical application of these results will be in the provision of air cooling for new projectors designed for high-level application, and that in such design when room is provided for adequately streamlined nozzles, proper flow paths, and so forth, a result much superior to what we were able to obtain with existing equipment can be realized. In particular, such new design should make it possible to reduce still further the noise level encountered in our experiments and to reduce the required pressure and power of the compressed air.

Inasmuch as the methods suggested by these experiments require consideration early in the design stages of projection equipment, the results are being reported now in order to make them available as

early as possible to the designers of equipment—and for the assistance of those who must increase the performance characteristics of present equipment.

Finally, it should be pointed out that the improvement obtained through the use of air cooling is not restrictive and that to these advances may also be added the previously outlined advantages of increased directional effect of the screen and the reduction of the heating from nonvisible components through the use of heat-absorbing glass, shutter modifications, dye images, and so forth.

Conclusions

- (1) Present projection practice subjects film bearing a silver image to a radiant-energy flux near the maximum that film will stand without loss of image quality and film damage because of the high-intensity projection effects.
- (2) A substantial increase in screen illumination can be obtained if the film at the instant of projection is cooled and mechanically restricted by high-velocity air jets.
- (3) The increase in screen illumination so obtainable should be 30 to 60% beyond the present safe maximum.
- (4) Optimum use of air cooling during high-intensity projection requires the provision for such cooling in the design of the projector mechanism, and of the other components of a projection system.

DISCUSSION:

DR. NORWOOD SIMMONS: In view of the

fact that in process or background projection in Hollywood wherein the camera film is integrating the positive image on the process screen during its entire stay on the screen, what is the effect of this drift of emulsion position or change of best focus? Would you say that this is evident in background work as poor resolution or lack of maximum sharpness in the final print?

DR. F. J. KOLB, JR.: It has always seemed to us that this negative drift we described must result in a lack of sharpness in background projection. The camera has no psychological mechanism such as the eye does, and the camera sees the image in all of the stages of drift from near-flat to maximum negative. Most of the time, the camera sees an out-of-focus image.

Unfortunately, our experience with background projection in Rochester is quite limited, and we have no photographic verification of the lack of sharpness in a negative exposed to a process screen. We should certainly be surprised, however, if it were not an important factor in the quality of background projection.

MR. DAVID B. JOY: I believe this is probably one of the most important papers from the standpoint of projection that we have heard here for a good many years, because all of us who are connected with light and its projection on the screen have realized that we have come up against an upper limit with the necessity of having to use some kind of a heat filter which at the same time absorbs an appreciable amount of light.

With the way pointed by this paper, that upper limit has been raised, and it would look as though it should be a great stimulus to the theaters in getting more and better light on a screen. I assume that this method is open to anybody who wants to make a practical application of it. Is it, Dr. Kolb?

DR. KOLB: We should be pleased to cooperate with anybody who is interested in making use of air cooling.

EXPORTS OF MOTION PICTURE VISUAL AND SOUND REPRODUCING EQUIPMENT

Equipment	Units	1949	Units	1948
		Dollars		Dollars
35-mm Projectors	2,424	837,579	4,154	1,637,679
16-mm Silent Projectors	4,046	382,602	4,830	543,753
16-mm Sound Projectors	9,017	2,245,499	8,440	2,357,505
8-mm Projectors	5,887	363,884	9,278	636,362
Total—	21,374	3,829,544	26,702	5,175,299
Sound Recording Equipment	—	615,674	—	1,591,696
Sound Reproducing Equipment	—	1,474,259	—	1,882,988
Arc Lamps	1,151	267,003	1,887	419,233
Motion Picture Screens	—	264,890	—	347,323
Total—		2,621,826		4,241,240
Total Equipment:		7,621,485		10,972,516

From a Manufacturer's Casebook

Differences of opinion anent fundamental technical law, no less than that applicable to horse races, make possible the presentation of this down-to-earth and informative data relative to an everyday problem of practical projection procedure. Comment on this article is invited.

SOME of the most interesting technical data of a highly practical nature relating to daily operating problems reposes in the files of equipment manufacturers and rarely is made available for the information and guidance of the projectionist craft generally. These data are in the form of letters which have been exchanged between manufacturers, on one hand, and supply dealers and projectionists on the other.

Always in the forefront of those enterprising manufacturers who stand ready at all times to render maximum service to the field, the Strong Electric Corp., of Toledo, Ohio, maker of arc lamps and other projection equipment, has made available to IP a file of letters bearing on a specific projection problem. Except for the deletion of the dealer's name and that of the theater, these letters are presented here verbatim.

TO STRONG ELECTRIC CORP.

We received two Strong Suprex rheostats for the . . . theater. These rheostats were ordered for 120-volt d. c. current, within the 40-70 amps range for Suprex carbons. On installing these rheostats, we are unable to pull more than 60 amps per lamp. I immediately checked the d. c. voltage coming into the projection room and found that it measured 115-116 volts.

Now, the problem is this: could these rheostats have been a 60-amp type which you shipped in error? We want to pull about 68 amps. The old rheostats used in this theater were pulling 60 amps, but an increase in light is desired now.

REPLY TO DEALER

All you need do to increase the arc current range is to cut off the resistance wire and then reconnect the wires to the bus bar at the bottom and back ends of the rheostats. These rheostats as shipped are correct for normal conditions. However, in some instances when the theater wiring may be small or the runs are long, so that there is an abnormal high voltage dip in the wiring, there may be too much resistance wire in the rheostat.

These rheostats are designed so that by simply cutting off some of the resistance wire they may be adjusted to any local condition. To shorten the resistance wire, turn the rheostat upside down, cut off the coiled resistance wire by about 4 inches, loosen the bolts on the copper bus bar and throw away all the short ends of the coils. Then stretch the remaining coils along their entire length and reconnect the ends to the bus bars. It is a simple job.

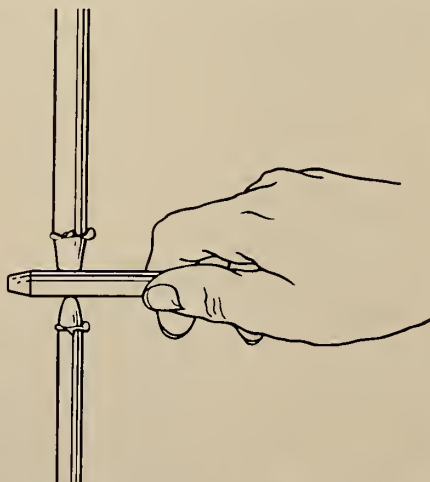
TO STRONG ELECTRIC CORP.

As previously explained, there is no appreciable drop in voltage in this particular projection room. We took a voltmeter and got voltage readings both at the panel and at the projector. The readings were 115 volts at both spots.

We cannot expect the theater to do the work making the changes in your rheostats as per your instructions, nor do we feel that we should go to the trouble and expense involved in this job. Please advise your preference: whether you wish the work done at your expense or shall we return the rheostats?

'Appreciable' Working Margin

While you are about it, perhaps it would be better to supply rheostats which would deliver up to 80 amps, rather than



Using the diameter of a 7-mm carbon as an accurate gauge for determining correct arc gap length of 5/16 inch.

to 70, so that we would have an appreciable working margin.

It seems to me that if we cut off portions of the coils, as you suggest, we are going to alter the voltage we get at the arc, thus embarrassing us further. I have not taken the time to work this problem out by the use of Ohm's law.

REPLY TO DEALER

Your recent letter indicates that you are somewhat confused regarding your Ohm's law and the behavior of a high-intensity arc, with the result that you attach all the blame to the rheostats. These rheostats are exactly as you ordered them, that is, they are adjustable from 40 to 80 amperes when the arc gap length is correct at 5/16 inch and the line voltage, as measured when the arc is burning, is 110 volts. At 115 volts these rheostats are adjustable up to about 84 volts.

However, if the arc gap be too long or the line voltage too low, the normal result will be low arc amperage. We shall try to explain how to correct for either of these abnormal conditions, which obviously are no fault of the equipment.

Two Adjustments Necessary

To increase the amperage of a high-intensity arc it is always necessary to make two separate adjustments: the rheostat is turned up and then the carbon feed on the lamp must be increased to compensate for the faster burning of the carbons at the higher amperage, so as to maintain the same 5/16-inch arc gap length.

To turn the rheostat up without speeding up the carbon feed will simply jump the arc amperage for a few seconds; but as soon as the current rises the carbons burn faster, the arc gap naturally lengthens and causes the amperage to drop back to just where it was previously, and one can keep on increasing the rheostat until one is blue in the face without getting the desired result.

The rule covering this point is simple: when the rheostat is turned up the carbons must be fed faster; failing this, all one gets is the same amperage and a longer arc gap length, *not* increased arc current.

The proper arc gap length at 65 amps

is 5/16 inch, which space may be easily measured by using a 7-mm negative carbon as a gauge, since the 7-mm is practically 5/16 inch. The diameter of a 7-mm negative should just touch the tips of both carbons as it is passed through the arc gap, preferably just after the arc has been extinguished after a 20-minute run.

By adjusting the motor feed to maintain the 5/16 arc gap length, you can increase the arc amperage as high as you want to with the ballast rheostat.

Drop in Line Voltage

Of course, if you have low d. c. voltage, that will also cause the amperage to be low. In measuring the d. c. voltage, the readings must be taken in the projection room and while the arcs are burning. To measure the voltage at no load, as you said you did, is of no value, because a drop in line voltage only occurs when the load is on: no load, no loss of voltage.

A drop in line voltage occurring when the load is applied indicates either too small wires or a very long run of wiring to the projection room; in other words, too much resistance in the wiring. Of course, a small drop in voltage is to be expected, but if the voltage falls to 105 or less when the arc is burning, it is an abnormal condition which may be corrected only by cutting out some of the rheostat wire, as explained previously.

To provide for the occasional job where the voltage is low, and when we have not been advised of such a condition, we have purposely built the rheostats so that it is a very simple job to cut off some of the resistance wire.

Another interesting situation is reflected by the appended exchange of correspondence:

To STRONG ELECTRIC CORP.

I have a pair of LOU-5 Strong Utility lamps with which I have been experiencing quite some trouble. When I throw-in the lamp switch the motors run O.K. As soon as I strike the arc the motors immediately go into reverse.

This reverse action is especially marked when I am burning-in new carbons. After the carbons are burned-in well the motors work O.K. Occasionally the same reverse action sets in when I am burning butts in carbon savers.

REPLY TO PROJECTIONIST

The LOU-5 Strong Utility is rather an early model lamp which if operated at the high amperage that is common today may result in the control motor being a bit too sensitive.

To overcome this difficulty by reducing the sensitivity of the motor, it is only necessary to shunt the armature with a 200-ohm resistor. We are sending to you, without charge, two of these resistors on mounting strips and with the connecting

Projectionist Examination Questions

From time to time IP receives requests from Local Unions and from individuals for a list of questions which are used in examinations for a projectionist license. Appended is the first group of such questions, with others used in various localities to appear in subsequent issues.

1. The color of the label of a N.E.C. fuse rated at 250 volts and 60 amperes is.....

2. The stamped rating of a link fuse is always.....per cent of its actual rating.

3. Carbons used for projection service usually have their diameters expressed in.....and their lengths in.....

4. That type of insulation which is used on arc jaws is called..... insulation.

5. Nitrocellulose film is known asfilm.

6. There are.....frames to every foot of 35-mm film.

7. 35-mm professional film is threaded into the machine so that the film is.....

8. On a professional projector the distance from the picture aperture to the sound aperture is.....inches or.....frames.

9. A rheostat is rated at 1250 watts and has a resistance of 2 ohms. This rheostat may carry, at rated conditions,amperes.

10. An imaginary straight line passing through the exact center of a lens or of all the elements of an optical system is called the.....

11. In a 35-mm machine in which

wire. The attached blueprint shows how they are to be mounted and connected.

If after installing these resistors you continue to have trouble, do not hesitate to advise us, indicating the size carbons used, the arc amperage, and the type and make of your generator or rectifiers.

Loew's Greater Profit in 1949

Despite a decline of \$6,475,400 in operating revenues, Loew's, Inc., in the year ended last Aug. 31 had a net income of \$6,744,761, greater by \$1,435,102 than the \$5,309,659 net in the previous fiscal year, company reported.

Additionally, an interim report for the 12 weeks ended Nov. 24 shows a net

the film speed is 90 feet per minute,frames will pass by the aperture in one minute.

12. In cementing lens elements together one usually uses.....

13. The black or opaque overlay on the sound track at splices is called.....

14. A wire which has a circular cross-section and a diameter of 1/1000 inch will have a circular area of.....

15. That device which instantly cuts off the light from the film and on the screen is called.....

16. That light source which supplies light to the photoelectric cell is called the.....

17. One thousand cycles is also called a.....

18. That device in a projector head which causes the film to remain stationary in the gate is called the....

19. The openings in the front wall of a projection room through which the light from the projection lens passes are called the.....

20. That blade of a rotating shutter which covers the projection lens while the intermittent sprocket is in motion is usually called the.....

[To be Continued]

profit after taxes of \$1,652,649, equal to 32 cents per common share, compared with a net of \$1,021,156, equal to 20 cents per share, in the first quarter of the last fiscal 12 months.

Earnings for the recent fiscal year are equal to \$1.31 per share, as compared to \$1.03 per share in the year ended Aug 31, 1948.

Bausch & Lomb Executive Changes

Bausch & Lomb Optical Co. has announced the election of President Herbert Eisenhart as Chairman of the Board. President of the company since 1935, Eisenhart will be succeeded by Joseph F. Taylor, whose former post as Treasurer will be filled by William McQuilkin.

Progress in Carbon Arc Lighting

Appended are excerpts from an address given recently by W. W. Lozier, of the National Carbon Co., before the American Society of Cinematographers. While this address naturally focussed upon carbons for studio lighting, it has interesting implications for the theater field.

IT WOULD perhaps be foolish to predict the course of future developments in carbon arc lighting. However, we can outline the direction of some of our experiments, our thinking and experience in other fields. Of course, just how much will be applied to any given field will depend upon the needs of that field, new developments, etc.

During the past decade we have done a large amount of experimentation with water-cooling of carbons, particularly as applied to specially designed carbons. We have found with carbons of suitable composition and construction that water-cooling, properly applied, increases the ceiling on operating current and brightness.

Arc Light Rivals the Sun

For example, 13.6-mm diameter carbons can be operated at as high as 300 amperes giving a crater brightness of more than 1600 candlepower per square millimeter, which is equivalent to the apparent brightness of the sun. Other carbons have been operated at a brightness of over 2000 candlepower per square millimeter.

Carbons presently used for studio lighting in general do not much exceed 900 candlepower per square millimeter brightness. The higher brightness of these newer carbons may find application where very intense beams must be projected.

It has been demonstrated that "flame swallows" can be used to control the positive tail flame and the products of combustion of the arc. A negative carbon in the form of a circular disc has been used abroad to obtain long burning life in small physical space. Air-blown arcs have been studied for special applications. Whereas these things may have been originally studied for application in other fields such as searchlights and motion picture projection, they are being scrutinized for studio applications.

Phenomenal Amperage Levels

Last year we carried out some experimental tests in Hollywood on 16-mm carbons burned at 500 amperes to produce at least twice as much light as the present maximum of the 225-ampere, 16-mm carbon used in the Type 450 "Brute" spot lamp. Considerable numbers of searchlights were used in Europe

during the war at very high currents, some of these ranging up to 1000 and 1200 amperes. Work was carried out here and also abroad on arcs at even higher currents for searchlights. These operated in some instances at currents as high as 4000 amperes.

It is theoretically possible to generate all of the light needed for a large set with a few very powerful units. There would, of course, be problems of control and distribution of the light, getting it to the right places on the set.

Perhaps we could turn back toward very early practices in motion pictures lighting where the light from the sun was used and directed into various parts of the set by means of suitably placed reflectors. There would, however, be one important difference. The light source, instead of being the sun with all of its uncontrollable features caused by atmospheric and astronomical variables, would be carbon arc lamps generating controllable and reproducible amounts of light of constant color.

Summary of Arc Advantages

Our laboratories are continuing their work with modern and improved equipment and are finding new and better ways of fabricating new and better carbons. . . .

The result of these developments over

Report Kodak Sets Jan. 1 Next For Nitrate Stock Exit

Eastman Kodak Company is reliably reported to have set Jan. 1, 1951, as its goal for 100% conversion to acetate film by all film studios. The report emanated from a meeting of producer and technical representatives in New York at which was discussed the most feasible means for disposing of nitrate film prints as they outlive their usefulness.

There is general agreement that even though acetate film will be used in production beginning next January, nitrate prints will continue to circulate for at least two years beyond that point before they are practically eliminated from the theater field. This means that projectionists will have to observe the same precautions as they do now with respect to identification and proper handling of both types of film.

the past decade or so is that it has given us a well-rounded group of lamps and coordinated carbons which produce highly successful results. It is perhaps well for us at this stage to stop and take stock, reviewing the attributes and advantages of carbon arc light.

1. *Wide range of types and sizes of lamp units.* These range from the 7500-lumen output of light well diffused for broadside illumination from the Duarc lamp through the Type 90 and the Type 170 spotlamps on up to the Type 450 spotlamp with its maximum of a quarter million lumens output.

2. *Very powerful units.* The usage of powerful lamps such as the Type 450 "Brute" makes it possible to illuminate large sets with reasonable numbers of lamp units and obtain desirable modeling effects and directional control over the lighting.

3. *The color of the light is best suited to the requirements of color photography.* The color has a desirable daylight quality and there is no need for any mental compensation to allow for visual color distortion in order to anticipate the end photographic result. The essentially continuous radiation spectrum of carbon arcs very effectively furnishes all wavelengths important photographically.

4. *The lamps have a fixed output.* The light output and its color remain constant throughout the life of a trim and from one trim to another.

Life, Cost, Dependability

5. *Fixed life.* At any given condition of operation carbon electrodes have a definite predictable life and you know just how long they will last.

6. *Known costs.* Due to definite life and other factors the operating cost can be reduced to definite tangible figures.

7. *Carbon arcs are of proven dependability.* There is no doubt about the light being available when it is wanted.

8. *Immediate availability.* The light from carbon arc lamps is instantly available without any need for warm-up, ovens, simmering current, etc.

9. *Basic simplicity.* A carbon arc source is fundamentally a very simple device. All that is required is that two electrodes connected to a proper source of electric power be touched, separated and then held a fixed distance apart.

10. *Instant accessibility.* Lamps can be examined and serviced immediately after shutting them off. There is never any need to defer examination of lamps until after they have been taken to a shop.

11. *Carbon arc lamps are safe.* Since they operate at normal atmospheric pressure, no undue precaution need be taken. Also, all voltages are in the range ordinarily accommodated without special provisions.

The 35-mm Projection Positive Film

By ROBERT A. MITCHELL

V. The Film Print and Its Handling

PHYSICAL injury to projection prints may occur in the processing laboratory, in the film exchange, in transit to and from theaters, and in the projection room. The photographic faults which arise through poor camera work and processing must be distinguished from physical damage, but such faults are nevertheless of great importance to the projectionist.

"What projectionist has not at one time or another received complaints of poor light when running a print so dense that no amount of illumination would provide the screen image with satisfactory contrast values? Likewise, 'development flicker' may be charged to an unstable arc; incorrect 'gamma' (contrast factor) to a soiled lens; poor camera focus or print 'fuzziness' to poor projector focus; and print unsteadiness to troubles in the projector mechanism."¹

A vast amount of damage is caused by improper or insufficient waxing of new prints by the film laboratories. Projectionists sometimes overcome this defect by "oiling" new prints; but it is only fair to say that perfectly satisfactory methods of lubricating films have not, as yet, been devised.

'Green' Emulsion Deposits

The emulsion of new ("green") prints is soft and easily affected by heat, which tends to melt the gelatine and make the emulsion gummy and sticky. The coating of the perforation margins on the emulsion side of the prints with carnauba wax minimizes, but does not prevent, the "sticking" of new prints during the first few projections in machines using high-powered arclamps. The sprocket holes of the film may be irreparably damaged.

Sticking is evidenced by a violent chattering of the film in the projector and by an extremely jumpy screen image. It is always necessary to remove hardened emulsion deposits from the projector gate after each reel of green film is run.

The lubrication of new prints by applying oil to the sides of the film roll, while not approved by either film manufacturers or exchange officials, is certainly much better than smearing the projector gate with vaseline or squirting

oil on the film as it runs through the projector.

Most film damage arises through hasty inspection and careless repair of prints in the exchanges. The film examiners are seldom allowed time enough to patch the prints, or even to inspect them thoroughly, hence the task is passed on to the projectionists.

The high-speed winding of film on rewinders in worn condition, not correctly aligned, or without sufficient hold-back tension on the dummy element, scratches the film, weakens splices, and roughens and nicks the edges, particularly when bent reels are used. Such mistreatment may be inflicted on the film both in exchanges and in theaters.

The bad practice of "pulling down" loosely wound rolls of film in order to tighten them causes "rain" by scratching both sides of the film.

An enormous amount of print injury comes about during shipping, particularly when the film is wound on bent reels and packed loosely in damaged shipping cases. "Shipping damage" is evidenced by bent and torn edges which require trimming with scissors, or even complete removal of the damaged footage.

Damage During Projection

Film damage may occur during projection by (1) too great a film-gate tension, causing torn and cracked perforations (2) worn sprocket teeth, which also tear perforations (3) worn and incor-

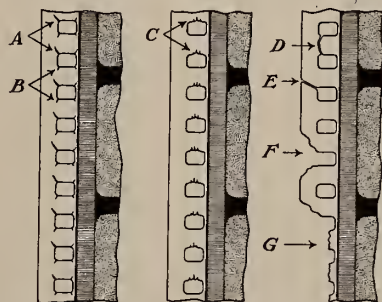


FIG. 1. Examples of damaged film perforations. A indicates normal wear, excessive gate tension, and worn sprocket teeth. B indicates excessive takeup tension and worn hold-back sprocket teeth. C indicates excessive gate tension (especially on new prints) and hooked intermittent sprocket teeth. D and E are common defects, but the cause is obscure. F and G are familiar examples of torn sprocket holes due to rough handling and improper rewinding.

rectly adjusted sprocket idlers, causing the edges of the film to shear and the film to jump off a sprocket and become indented by the sprocket teeth (4) worn rollers and accumulations of dirt in the fire valves, causing soiled and scratched film, and (5) the unavoidable heat of the gate and intense concentration of radiant energy impinging upon the film at the aperture.

1. GATE TENSION. This should be uniform and exert a "drag" on the film between 8 and 24 ounces, the exact value depending on the make of projector. A gate tension of about 12 ounces is average. A tension in excess of 24 ounces is definitely not recommended.

2. SPROCKET TEETH. Worn or hooked sprocket teeth are especially damaging to film perforations. Worn sprockets should be reversed or replaced. In most projectors, the intermittent and sound-head hold-back sprockets wear the most rapidly.

3. SPROCKET IDLERS. An idler roller should be separated from the face of the sprocket by a distance equal to 2 thicknesses of film. All idlers must be aligned so as not to shear the edges of the film.

4. FIRE VALVES. The fire-valve box should be kept scrupulously clean to avoid scratching the film. Dirt in the 4-roller type of fire-valve may cause the film to jam and tear at splices. Worn and scored rollers should be replaced.

5. GATE HEAT. By far the greater amount of heat absorbed by film in passing through a projector comes from the hot metal runners which contact the perforation margins of the film. Some heat is also radiated from the metal of the gate to the picture portion of the film, but very little of the intense heat of the light beam to which the film-pictures are exposed, frame by frame, is retained by the film.

This may seem strange when we stop to consider that the temperature of the gate runners is 30° C. to 100° C. (86° F. to 212° F.) while that of a lamp-black-coated piece of metal held in the light beam at the aperture ranges from 300° C. to more than 1,000° C. (572° F. to more than 1,832° F.), but it is true in almost every case and is easily demonstrated.

Determining Heat Level

The bulbs of suitable thermometers may be held against the film just below the intermittent sprocket. When allowances are made for the conduction of

¹ "Projection-Room Handling of Prints," by Robert A. Mitchell; IP for March 1948, p. 5.

heat from the margins of the film by the face of the intermittent sprocket, it will be found that the edges of the film are considerably hotter than the middle. Moreover, as a European correspondent has pointed out, "the first meters in a reel always feel cold, while the end can be very hot."

Since both the first few feet and the last portions of a reel receive the same amount of light (and radiant heat) at the aperture, it is logical to conclude that the heat has come from the gate runners which increased in temperature (up to a certain limit) as the projection of the reel progressed.

But this does imply that the heat received by the film from direct irradiation is unimportant, however. Two entirely distinct phenomena are involved.

The beam of light at the aperture communicates very little heat to the film, raising the temperature of the middle portion of the film only a few degrees above room temperature. When nitrate film attains a temperature of about 180° C. (356° F.) it ignites; so it is obvious that even a "1,000-degree light beam" is incapable of raising the temperature of film exposed to it for 1/32 second or 1/48 second to even the ignition temperature of 180° C.! What is the explanation of this apparently paradoxical situation?

Use of Glass Light Filters

In passing through the intense beam of light the surface of the emulsion in the darker portions of the picture image may be heated to several hundred degrees *above* the ignition temperature of nitrate film. But the layer so heated is so thin that very little heat (calories) is communicated to the film base; and nothing other than a move or less severe warping, or embossing, of the film results. The lighter portions of the emulsion absorb very little heat by direct irradiation, for much of the infrared radiation passes through the film with the visible light.

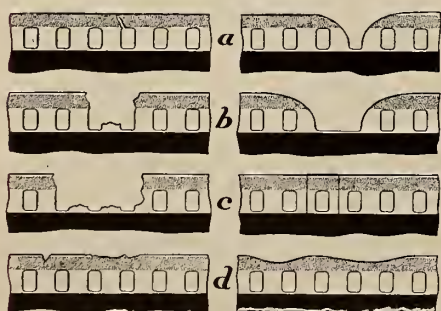


FIG. 2. Various types of film tears, with suggested measures for correcting each: A—One-perforation tear, corrected by trimming to smooth curves. B—Two-perforation tear before and after trimming. C—Three-perforation tear, best corrected by cutting and splicing. D—Roughened film edges trimmed smooth.

The phenomenon is analogous to passing one's finger through a candle flame (temp. 1,100° C.) without getting burned.

When extremely high arc amperages are used, the superficial heating of the emulsion in the dark portions of the picture is so intense that a slight blistering of the gelatine occurs. This is similar to the blistering and charring of the emulsion of negatives in cameras photographing, without filters, the explosion of old-type atomic bombs at a distance of about six miles.²

The use of special heat-absorbing glass filters with all arc lamps using more than 70 amperes is recommended. However, one thick filter should be used in place of two or more thin glasses to avoid surface-reflection losses.

Film Damage During Projection

There are three important types of film damage for which the projectionist is usually responsible, namely, (1) the mutilation of leaders by painting crosses, numbers, *etc.*, on them (2) the placement of picture-defacing changeover and other cues at the end of the film, and (3) the shortening of leaders, runouts, opening titles, and THE END titles by the practice of "doubling up" short reels (splicing two short subjects together and winding them on one large reel). Conscientious projectionists deplore these practices.

"In the matter of conserving leaders, projectionists can help by using great care in threading and by refraining from marking reel numbers, titles, *etc.*, on the leaders with indelible ink. Notations should be confined to the first few feet of the plain 'protection leader,' and then written only with easily-erased, cellophane-marking crayon.

"The painting of squares and crosses on threading-up footage-number frames has high nuisance value, as has also the cementing of opaque strips of film across leaders . . .

"Inasmuch as the standard release print depends for its effectiveness on the exact positioning of the cues and leader footage numbers, projection efficiency is reduced when these have been mutilated. It is the responsibility of the distributor to replace leaders which have become unduly shortened through repeated use, and it also behooves him not to overdo the replacement of film to the extent of interposing several yards of black film between footage number 3 and the start of the picture. Such excess footage must be removed by the projectionist.

"The motor start and changeover cues

² The peculiar black spots in pictures of atomic-bomb explosions are due partly to photographic reversal caused by intense overexposure and partly to a burning away of emulsion which, in such cases, may attain superficial temperatures of thousands of degrees for a very small fraction of a second. The film base does not catch fire.

are frequently rendered unsightly by projectionists who fear that they may not catch the printed cues when they flash on the screen. Much worse is scratching curtain cues into the emulsion, for their presence is likely to be confusing to projectionists who subsequently use the film. Curtain and lighting cues should be marked on the film with crayon, and then wiped off when the film has completed its run.

"Motor start and changeover cues which are really too faint to be seen on the screen may be rendered visible by *lightly* scoring them with a regular cue-marking device, several of which are on the market. Holes should never be punched in the film for any reason, and those distributors who punch identification symbols on titles which are to be projected should refrain from the practice."³

Repairing Prints, Splicing

All film (even new prints) should be carefully inspected by the projectionist prior to showing, and all physical defects corrected. The inspecting operation is performed by rewinding the film slowly by hand and passing the film between thumb and finger in order to detect splices and torn edges. Every splice should be examined for strength by twisting or bending it very slightly, special attention being directed to the ends of the splice at the edges of the film. Splices that lift at the ends, but are otherwise strong, can often be "doctored" by dabbing a little film cement between the two stubs and pressing with the fingers.

Torn edges and sprocket holes may be corrected by judicious trimming, as shown in the accompanying illustrations, if the defect is not too great.

The secret of making smooth and perfectly strong film splices is found in the operator's technique and in the film cement used. A satisfactory film splice has a greater tensile strength than the

(Continued on page 31)

³ "Projection-Room Handling of Prints" by Robert A. Mitchell, IP for March 1948, p. 5.

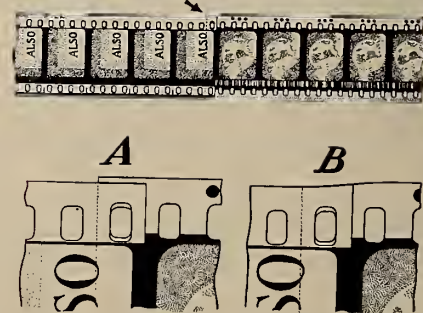


FIG. 3. When unshrunk film is spliced to shrunk film, the resultant rough edge should be trimmed smooth.

THE first drive-in theater was built near Camden, N. J., in 1933. By the end of World War II, there were only about 60 drive-in theaters, indicating that the idea had caught on slowly during those eight years before the war. During the four years since VJ Day more than 1000 drive-ins have been constructed and many more are being planned or are under construction.

As soon as unrationed gasoline became available, the public took to the highways for the wide-open spaces. The drive-ins were doing capacity business. Prospective theater owners could not build indoor theaters at first because of government restrictions on building materials.

It was quickly realized that drive-in theaters could be constructed of readily available materials and equipment. It was also determined that they could be built at a cost of approximately 20% of the postwar costs involved in building an indoor theater of an equivalent patron capacity, based on an average drive-in audience of approximately three patrons per car.

Marked Advance in Equipment

Simultaneously, postwar projection and sound equipments were announced which had been designed and built expressly for drive-in theater use. It made obsolete most of the equipment used in drive-in theaters before the war, especially the sound equipment. The largest single factor in contributing to public acceptance of drive-in theaters is the in-car speaker, introduced by RCA in 1941 just before the war.

Experience gained prior to the war pointed the way to successful drive-in theater construction, equipment, and management. The in-car speaker removed most of the restrictions on locations where the use of centralized speaker systems at the screen would have classed them as public nuisances. For the first time, a theater patron had complete control over the sound.

† J. Soc. Mot. Pict. Eng., Feb. 1950.

The Trend in Drive-In Theaters†

By CHARLES R. UNDERHILL, Jr.
RCA Victor Division, Camden, N. J.

Here is a roundup article which covers all phases of the drive-in theater—planning, construction, and operation—and which provides a comprehensive picture of the rapid development of this comparatively new setting for modern motion picture entertainment.

To the amazement of even the drive-in theater owners, in came a type of patronage rarely seen at indoor theaters: the physically handicapped, invalids, convalescents, the aged, deaf people, expectant mothers, parents with infants and small children—whole families, dressed as they pleased in the privacy and comfort of their own domain on wheels.

The 'Forgotten Audience'

They are continuing to come in increasing numbers from rural, suburban, and city areas—a new clientele representing a long neglected but highly important segment of some 30,000,000 people of the "forgotten audience," who, according to the claims of some producers, had not been attending indoor movie theaters. These are the backbone of drive-in theater patronage, and everything is being done to retain their acceptance of the drive-in theater.

Drive-in theater patrons can do as

they please within the dictates of decency in the privacy of their automobiles. They can shell and eat roasted peanuts, smoke, hold a normal conversation, regulate ventilation, and relax in wider and more comfortable seats with more leg room than is possible in an indoor theater. There is no parking problem or standing in line for admission. Parents are relieved of the worries and expense associated with employing suitable baby sitters, or of the conduct of their children if left at home. Obviously, no drive-in theater can afford a reputation for being lax in enforcing good conduct.

Special Services, Features

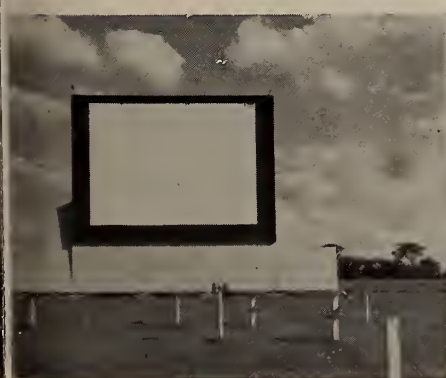
Taking their cues from the gasoline filling stations of the leading oil companies, aggressive drive-in theater exhibitors render those extra services and courtesies which experience has proven gain public favor: windshield wiping, car towing, tire changing, a free gallon of gas for dry tanks. Many other services have been made available to the public which are customarily not found in most indoor theaters. There are diaper and other vending machines carrying personal items, free bottle warmers for baby formulas, a nurse in attendance, call service for doctors or others subject to emergency service calls.

Thus, the drive-in theater has long since passed from the novelty category into the realm of big show business. As the number of drive-in theaters has increased, picture availability has improved, bringing in the regular movie-going public by the car-full.

Returns on capital investment are an investor's dream and have been so startling as to attract new capital from sources far remote from the theater business. The maintenance costs of drive-in theaters have been estimated to run as low as 20% of those for an indoor theater. The concession business of the drive-in theater is the envy of almost any roadside stand and is estimated to

(Continued on page 28)

THREE VITAL ELEMENTS IN THE OPERATION OF A DRIVE-IN THEATER: SCREEN, PROJECTION ROOM, AND PROJECTOR



IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

THE latest "economy" antics of Hollywood run true to the form established many years ago when the industry was a pup, but this time the procedure is so weird and so obvious that it prompted some very outspoken comment by several of the nationally-syndicated columnists, hard-boiled though these fellows be.

These commentators refer biting to those studio tactics which result in wiping off the payroll scores of workers who are in the \$40-to-\$100 bracket the while a huge mass of executive and so-called artistic talent, some of whom receive weekly paychecks ranging from several hundreds into the thousands of dollars, are unmolested—in fact, even ignored to the point of not being given a definite assignment.

Such happenings merely strengthen our conviction of long standing that the real workers in this industry—the fellows who *must* work a given number of hours weekly—are grossly underpaid and, further, that they should not budge an inch when the "economy" wave sweeps out of the studios and over the theater field, as it usually does.

- A bill introduced in the N. Y. State Legislature by Assemblyman Ashcroft of Utica suggests the following amendment to the labor law, in relation to motion picture projection rooms in the state:

"Motion picture projection booths in places of public assembly shall be equipped with facilities to promote and preserve the general health, convenience and comfort of the occupants thereof,

and to discourage the development of diseases, ailments or other physical impairments. . . .

"Such rules and regulations may provide minimum standards for cubic foot capacity of projection booths; for ventilation and regulation of the temperature thereof; of adequate and proper lighting facilities and for such other appurtenances as in the judgment of the board may tend to promote the general physical welfare of occupants of projection booths. Such rules and regulations may limit the number of consecutive hours that an operator may be permitted to work with a rest period, and may prescribe the minimum duration of rest periods."

Such an enactment has long been needed in N. Y. State, where so many projection rooms are little more than pest holes, with practically no ventilation or sanitary facilities.

- Cecil R. Wood, Sr., veteran member of Local 306 and former president of the 25-30 Club of Greater New York, has recovered from his recent illness and is back at work at the ultra-modern Paris Theater. Cecil celebrated his 77th birthday not so long ago, but his stamina and enthusiasm for craft welfare belie his age. Smooth sailing, Cecil.

- The 50th birthday of IA President Walsh was celebrated several weeks ago with a testimonial dinner-dance in the Grand Ballroom of the Hotel St. George, Brooklyn, N. Y. The affair was attended by numerous labor leaders from all parts of the country, headed by William Green, president of the AF of L and by

government officials and industry executives. The event, sponsored by IA Local Unions comprising the 10th District (New York State), was under the direction of the District executive board, whose members include Thomas Murtha, Local 4, Brooklyn; H. Paul Shay, Local 289, Elmira; Albert Ryde, Local 233, Buffalo; Don Rood, Local 128, Utica; M. J. Mungovan, Local 25, Rochester; Nat Storch, Local 366, Westchester County; John McDowell, Local 1, N.Y.C., and Sal J. Scoppa, Local 798, N.Y.C.

Eric A. Johnston, president of the Motion Picture Association of America, addressed the gathering, paying tribute to Walsh as an intelligent and determined fighter for a cause that he considers just, and as a frank critic of a cause that he believes to be unjust.

AF of L President Green commended Walsh for guiding the IA to "an enviable position in the entertainment industry." He also praised Walsh for his work as a member of the administrative committee of Labor's League for Political Education.

On behalf of the 10th District, Green presented Walsh with a gold life membership card in Brooklyn Local 4, of which Dick is president. Accepting the card, Walsh pointed out to the gathering that 90% of all union contracts are successfully negotiated without any work stoppages.

Toastmaster Tom Murtha was introduced by John McDowell, secretary of Local 1. Invocation was by Rev. Francis A. Gowney, of Buffalo, chaplain of the 10th District. The national anthem was sung beautifully by Lenore Pernick, daughter of Solly Pernick, popular business representative for Local 1. Tom Loy, director of public relations for the Alliance, did a grand job in handling the press.

About 1500 people attended the celebration. Representatives of IA Local Unions from all parts of the country were present, as were all the members of the official family, headed by William P. Raoul, IA secretary-treasurer; Thomas J. Shea, assistant IA president; IA Vice-Presidents Harland Holmden, Cleveland; William Covert, Toronto; Floyd Billings-



IA President Dick Walsh presented retiring general manager Edward Johnson of the Metropolitan Opera House a wrist watch and a gold life membership in the IA. Shown here (l. to r.) are John B. Fitzgerald, IA representative and president of Cleveland L. 27; Johnson, John C. McDowell, secretary of L. 1, N. Y. City, and President Walsh.

Radio 'Ham' Call Letters

An estimate that at least one in every twenty projectionists is a radio "ham" is advanced by Amos R. Kanaga, secretary of Local 409, San Mateo, Calif. Amos thinks it would be a fine thing for the craft if this department printed from time to time the names, call letters and locations of IA men who are radio "hams." We concur enthusiastically with this thought, and these few lines may be considered as an invitation to all projectionist "hams" to send in the aforementioned data.—H.S.

ley, San Francisco; James J. Brennan, New York; Roger M. Kennedy, Detroit; Felix D. Snow, Kansas City; Carl G. Cooper and William C. Barrett, Los Angeles, and Louise Wright, Dallas.

The Walsh celebration afforded us an opportunity to greet many of our old friends and to rehash incidents of days gone by. We were particularly pleased to greet our very good friends Johnny Fitzgerald of Cleveland; Eddie Miller, Houston; Orin Jacobson, Tacoma (a guy who is careless with his ties); Jim McNabb, Seattle; R. E. Morris, Mobile; Al Johnstone, New Orleans; Maynard Baird, Knoxville; Charlie Hathaway, Oklahoma City; Steve Newman, Los Angeles; Larry Katz, Harrisburg, and many others. It was a grand party and a swell reunion for us old-timers.

- The regular semi-annual meeting of the IA executive board will be held at the Hotel Vancouver, Vancouver, B. C., the week beginning Monday, March 20. This will mark the first time in the history of the Alliance that the IA governing board will meet in Vancouver.

- TMA Jottings: Charters have been issued to two new Lodges—Lodge No. 141, Westchester Co., N.Y., and Lodge No. 142, Hollywood, Calif., with Larry Sabatino as president of 141 and Roy Hostetter president of 142.

- One of our prized possessions is a photograph sent to us several years ago by William Hartnett, Ottawa Local 257 business representative, of the IA officials and delegates attending the 11th District Convention which was held in Kingston, Ontario, October 1922. Of the 31 IA men appearing in this picture, all have passed on but four of us—Bill Covert, IA vice-president and business representative of Toronto Local 173; William Hartnett, Local 257; George Jones, secretary of Local 173, and yours truly, who attended the Convention as an IA representative.

Among those appearing in this picture are Charlie Shay, then IA president; Frank Lemaster, IA secretary-treasurer; P. J. Ryan, Bill Dillon, Joe Magnolia, and Lou Krouse, IA representatives.

- Our good friend, Charles A. Vencill, secretary-treasurer of Los Angeles Local 150, informs us that the Local is now doing business at its new headquarters—1800 South Vermont Avenue. A toast to the Local's success in its new home is one of the things we have scheduled for the IA Convention in Detroit next August.

- Shortly after his election as president of Local 225, Atlanta, Ga., death claimed Al Kemp. Although Al had been ailing for quite some time, his interest in Local affairs never wavered and he remained an important factor in union activities until the end.

- Robert W. Greer, president of Local 386, Columbus, Ohio, has been re-elected president of the Columbus Federation of Labor.

- At the recent testimonial to Edward Johnson, retiring general manager of the Metropolitan Opera House in New York City, IA President Walsh presented the impresario with a gold wrist watch and a gold life membership card in the Alliance. There was no doubt in the minds of those present at the affair as to the esteem in which our organization is held in theatrical circles.

- Hard luck has been dodging the footsteps of Allen G. Smith, popular manager of National Theater Supply Co.'s N. Y. C. branch. Allen has been in and out of the hospital several times during the past year. We hope that his recent stay there finally licked whatever it was that troubled him.

- Pointing out that the 20% federal theater admissions tax was a "serious deterrent to business at the nation's box offices and thus threatens the livelihoods of many thousands of workers employed by this industry," IA President Walsh appealed to the AF of L executive council for the organization's support in the fight to repeal this tax. The executive council voted full backing of the Federation in this fight, and passed a resolution urging Congress to repeal the excise taxes on a list of services headed by the amusement industry.

- Although Clayton D. Bridges, charter member of Local 413, Gadsden, Ala., is



today only 53 years old, he has been a motion picture projectionist for the past 33 years. Under the tutelage of J. Roy Hunt, now an ace Hollywood cameraman, Bridges operated his first projection machine when he was only 15. Several years later, together with L. L. Smith and M. C. Mauney, also charter members, Bridges helped organize Local 413.

- Houston Local 179 can now boast of having the legal profession represented in its ranks. Lester F. Hall, member of the Local, is a practicing member of the bar. While a student at the University of Oklahoma, Hall was instrumental in organizing Local 715, Gainville, Texas, and served as its first business representative.

In 1939, one year after the Gainville Local was chartered by the IA, Hall left the University and moved to Houston where he worked as a projectionist until December, 1942, when he enlisted in the US Navy. He later became a naval pilot and was returned to inactive duty December, 1945, with the rank of lieutenant, senior grade. In January, 1946 he entered law school, receiving his LL.B degree three years later; passed the bar examination in July, 1949, and four months later opened his own law offices.

- In a recent feature article appearing in the *Evening Bulletin*, Providence, R. I., Sydney T. Clarke and Arthur P. Slater, officials of Local 223, selected "Gone With the Wind," as the best motion picture ever made, with "Mutiny on the Bounty" running a close second. Clarke and Slater, both veteran projectionists, have been employed at Loew's State Theater in Providence for the past 30 years, and they certainly may be con-

Snapped at the recent 50th birthday party tendered IA President Dick Walsh at the St. George Hotel, Brooklyn, are (l. to r.) Carl Cooper, 7th IA vice-president; Sol Scoppa, L. 798, N. Y. City; Thomas V. Green, IA delegate to the AF of L convention; Harland Holmden, 1st IA vice-president, and Albert F. Ryde, bus. rep. for Buffalo L. 233.



sidered as qualified judges of worthwhile films.

• We were glad to hear that M. D. O'Brien, assistant supervisor of projection and sound for Loews, Inc., is now convalescing from the serious illness with which he was stricken last Fall while supervising theater installations in London, England. Since it will be quite some time before he will be able to personally answer the many letters he has received, Obie has asked us to express through the medium of these columns his gratitude and thanks to his many well-wishers. Obie is now recuperating in Florida, where he plans to remain for several months.

• *Recent out-of-town visitors to the offices of IP:* Milton Karp, Toronto Local 173; Tom J. Kearney, San Francisco Local 162; Eddie Miller, Houston Local 279; R. E. Morris, Mobile Local 142; Jim McNabb, Seattle Local 154; Orin M. Jacobson, Tacoma Local 175; Harry H. Lackey, Utica Local 337.

IA ELECTIONS

LOCAL 236, BIRMINGHAM, ALA.

J. C. Harper, Sr., *pres.*; Fred Pinkard, *vice-pres.*; J. W. Tate, *sec.*; W. H. Harper, *treas.*; Ralph Root, Sr., *bus. rep.*; J. N. Cason, *sgt.-at-arms.*

LOCAL 337, UTICA, N. Y.

Cletus Messman, *pres.*; John Stuczko, *vice-pres.*; Sam Grieco, *rec.-sec.*; William Frey, *fin.-sec.*; Harry H. Lackey, *cor.-sec.*; Fred Messman, *treas.*; H. H. Lackey, *bus. rep.*; Don Ryan, Dick Roberts, *members at large*; Nick Cullen, *sgt.-at-arms*; H. H. Lackey, *del. Utica Fed. of Labor, AF of L.*

LOCAL 396, BINGHAMTON, N. Y.

James H. Holly, *Pres.*; Henry H. Cole, *vice-pres.*; Chas. W. Johnson, *fin. sec.-treas.*; Leon D. Clark, *rec.-corr. sec.*; Earl Tuttle, *bus. rep.*; F. Donald Minkler, *sgt.-at-arms*; Jerrold B. Brown, Americo Di Pietro, Francis X. Schofield, *trustees.*

LOCAL 409, SAN MATEO COUNTY and PALO ALTO, CALIF.

Charles Wagner, *pres.*; Amos R. Kanaga, *sec.*; Carl George, *fin.-sec.*; John Turturici, *bus. rep.*; Ray Cayla, Robert Dunbar, Storme A. Wade, Rudy Ivanicich, Wes Schenkel, *exec. board*; Carlyn Bayman, Howard Bobbitt, Albert Cernac, *trustees.*

LOCAL 414, WICHITA, KANS.

Albert N. McLain, *pres.*; Charles H. Winslow, *vice-pres.*; Seth E. Barnes, *rec.-sec.*; Ernest E. Dinsmore, *treas.*; William A. Lee, *bus. rep.*; Gene Watkins, *sgt.-at-arms.*

LOCAL 451, NEW CASTLE, PENNA.

Joseph J. Carson, *pres.*; Thomas E. Roberts, *vice-pres.*; William J. McCormick, *rec.-sec.*; William F. Hall, *fin.-sec.*; John P. Brogan, *bus. rep.*; Robert O. Woodring, *sgt.-at-*

arms; George A. Kalata, Robert Woodring, Robert H. Thompson, *trustees*; J. J. Carson, *del. IA Convention.*

LOCAL 523, QUEBEC, CANADA

Charles Pacaud, *pres.*; Edward Haines, *vice-pres.*; Frank Kipling, *sec.-treas.*; Jules Pacaud, *rec.-sec.*; Edmond Haines, *bus. rep.*; Alex Guilbault, Leo Poulin, F. Kipling, Jacques Bertheaume, *exec. board*; J. Pacaud, Lionel Villeneuve, Alphonse Mignault, *auditors*; Louis Larouse, L. Poulin, *del. Federated Trades and Labor Council.*

SMP & TE 66th Meet in Chicago

The sixty-sixth semi-annual convention of the Society of Motion Picture and Television Engineers, formerly the Society of Motion Picture Engineers, will be held April 24-28, inclusive, at the Drake Hotel in Chicago.

Feature event on the program will be a comprehensive symposium on television program production. Other scheduled highlights include symposia on high-speed photography and high-intensity projection. In charge of the papers

program for the meeting is R. T. Van Niman, 4501 Washington St., Chicago 24, Ill.

Heyer-Schultz Metal Mirror Data

Heyer-Schultz, Inc., have issued a new booklet containing complete information on their all-metal projection reflectors, including an entirely new section relating to correct installation and alignment of the units. New H-S reflectors now being developed range from 12 to 16½ inches in size and will serve any type of arc lamp.

H-S reflectors are now being distributed through all RCA supply dealers as well as through all branches of National Theatre Supply Co.

Ballantyne's New Drive-In Booklet

Now available from the Ballantyne Co. is a colorful booklet describing the complete "packaged" drive-in theater construction and outfitting plan, together with a detailed description of all products offered by the company. Copies of this booklet may be had free of charge upon request to Ballantyne at 1707 Davenport St., Omaha, Neb.

25-30 Club Guests of IPC for Simplex X-L Showing

One of the standout educational and social affairs of the season was held in mid-February when the members and guests of the 25-30 Club of New York assembled at the International Projector Corp. factory in Bloomfield, N.J., for a lecture-demonstration of the new Simplex X-L projector.

A banner turnout of more than 200 was present to hear Herb Griffin, vice-president of IPC, veteran IA man and a member of the 25-30 Club, collaborate with Arthur Meyer, sales manager for IPC, in detailing the highlights of this new mechanism. Lester Isaac, director

of sound and visual projection for Loew's Theaters, summarized his findings anent the Simplex X-L projector after 16 months of daily operation, and he was assisted in this chore by Wally Byrne, of Loew's State Theater, New York, who was the first projectionist to operate this mechanism in a commercial theater.

A pleasant interlude during the evening was when Arthur Meyer and Admiral R. E. Tompkins (Retired), president of IPC, were awarded honorary memberships in the 25-30 Club. Following the demonstration the entire group was served a sumptuous buffet supper in the factory restaurant.

NEW YORK 25-30 CLUB GUESTS OF SIMPLEX FOR X-L MECHANISM DEMONSTRATION



Gathered at the International Projector Corp. plant at Bloomfield, N. J., were (front row): Tom Forestieri and Ben Stern, trustee and financial secretary, respectively, of 25-30 Club; Mike Berkowitz, former president of the Club; R. B. Tompkins, president of IPC; Al Koy, 25-30 Club president, and Harry Sherman of IP. Standing in rear, left to right: Ed Dougherty, Local 384, Hudson County, N. J.; Morris Klapholtz, 25-30 secretary; Arthur E. Meyer, IPC sales manager; Tony Boscarelli, Local 384, and Morris J. Rotker, past president of the 25-30 Club.



FCC's Theater Tv Hearing To Consider 10 Issues

IN RESPONSE to numerous group and individual petitions from various motion picture units, the Federal Communications Commission will sponsor a Hearing on Allocation and Rule Making for theater television. Although no definite date for the hearing has been announced, it is believed that it will be held in the near future.

The Commission's announcement stated that it desires "to obtain full information concerning all aspects of theater television; and to afford all interested parties an opportunity to participate in furnishing related information."

The hearing will consider in detail the following ten issues:

Transmission Facilities Probe

1. To determine whether the existing and proposed transmission requirements for theater television can be satisfied by existing and proposed common carrier wire facilities or by existing and proposed common carrier fixed station facilities operated in bands of frequencies now allocated to such stations.

2. To determine the order of frequencies and the spectrum space required, if any, at each order of frequency which would be necessary to establish a theater television service.

3. To obtain full information concerning existing or proposed methods or systems for exhibiting television programs on large screens in motion picture theaters or elsewhere.

4. To obtain full information concerning existing or proposed methods or systems for transmitting or relaying television programs from the point of pickup to the exhibiting theater, by use of radio frequencies, coaxial cable, wire, or other means, including intra-city and inter-city transmission.

Experimental Data Asked

5. To obtain full information concerning any technical data obtained in experimental operations conducted in the theater television field, or otherwise available.

6. To obtain full information concerning any nontechnical data obtained in experimental operations conducted in the theater television field, or otherwise available, including public need or demand for the proposed service, public need or

desires in theater television programs, approximate uses for the service, and commercial feasibility of the service.

7. To obtain full information concerning plans or proposals looking toward the establishment of theater television on a commercial or non-commercial basis.

8. To determine whether persons engaged in furnishing theater television services would be engaged as common carriers for hire in interstate communications by wire or radio, within the meaning of Section 3(h) of the Communications Act of 1934, as amended.

'Public Interest' Determination

9. To determine whether, if frequencies are to be allocated for the purpose of providing a theater television service, such service should be established on a common carrier or non-common carrier basis, and if on a non-common carrier basis, the conditions under which such service would be made available.

10. In the light of the evidence adduced under the foregoing issues, to determine whether or not the public interest would be served by the issuance of a proposal for allocation of frequencies to a theater television service and by the promulgation of proposed rules and engineering standards governing such a service.

RCA Large-Screen Tv Systems for New York Circuit

Two large-screen theater Tv systems of the instantaneous-projection type have been ordered from RCA by Century Circuit, Inc., which operates a string of theaters in New York and vicinity. One system will go into a new 2200-seat theater on Long Island, with the other scheduled for the 2500-seat, 28-year-old Albe-marle Theater in Brooklyn.

It is hoped to deliver both systems early next summer. Each will consist of an RCA Model PT-100 theater Tv projector and associated power supplies, amplifiers, and control console. They are designed to produce a screen image 20 by 15 feet in size at an optimum throw of about 65 feet.

Programming plans for the two theaters encompass initially the showing of

special sports and news events, as they occur, in combination with regular motion picture fare. Long-range plans include the exploration and development of special forms of Tv entertainment suitable for theater presentation.

Extend A.T.&T. Tv Mileage

Seven more cities were added to the Bell System's present 18-city Tv network during the latter part of 1949, and an additional 18 cities will join the web in 1950. A. T. & T. recently informed the Federal Communications Commission. Plans also call for the addition of more channels to existing routes.

The System's Tv network mileage was about 8400 channel miles at the end of 1949—some two and a half times greater than at the beginning of the year. By the end of 1950 the intercity network will have grown to some 15,000 channel miles. Engineering work is under way west of Omaha, Neb., looking toward the extension of radio relay channels to San Francisco.

Theater Newsreels Still Rate High

Eighty-three per cent of patrons of five theaters on Long Island, N. Y., and New Jersey who were quizzed by MPAA researchers said that they preferred the inclusion of newsreels in their screen entertainment. Newsreels are now pressing the association to extend the survey to cover a hundred or 200 theaters in more widely separated areas to get a national reaction.

Those quizzed in the pilot survey said that their newsreel subjects preferences were (1) sports, (2) femme fashions and (3) human-interest stories.

Findings are accepted as refuting the claims being made that the newsreels were on their way out under blows delivered by Tv, which has demonstrated its ability to beat the reels with spot coverage on a time basis.

PHOTOGRAPHY REVEALS: A recently developed electrically-operated camera, mounted on top of a bus or truck, photographs the road ahead about every 500 feet. Where more careful driving is demanded, as on twisting roads or when slowing down, the camera is automatically changed to make one exposure every 50 feet. This enables the truck or bus operator to check the driver's actions through the trip.

Movie Projection in Saudi Arabia

By L. F. ADAMS

International-Bechtel, Inc.

THE position of motion picture projectionist in these remote outposts of American enterprise is likely to entail considerably more than just the operation and maintenance of projectors. Along with "putting them in and taking them out," one must be prepared to fulfil the functions of film inspector, theater publicist, house custodian, sound serviceman, electrician, shipping and receiving clerk, and even advisor on amateur photography.

All this is less complicated than it may seem, as most of these duties are performed by those employed for the purpose, but it is still necessary to be in readiness.

For example, since arriving in Saudi Arabia several months ago, the writer has been obliged to inspect a number of prints foot by foot, making most of the many splices over, removing misframes, and trying to make up sufficient leaders. Downstairs, the Arab janitor had to be instructed in sweeping, cleaning, and seat arrangement. Since there was a language barrier, the instruction consisted of our performing the job and then following him through.

Then there was a donkey race, complete with pari-mutuel betting, requiring the setting up of a public address system; and two recent flash shows, employing stage and spotlights. In addition, it is frequently necessary to check films on and off special planes, so it will be seen that one may be quite busy at times. Mostly, however, there is only the exhibition of single features to be handled, and this is a simple matter out here.

Inasmuch as moving pictures are taboo for most Moslems, the few installations are for the benefit of American and European personnel of the several oil companies and their contracting organizations now operating throughout the Middle East.

There are eight theaters in this general area: one is operated by the Kuwait Oil Company for its personnel in the Sheikdom of Kuwait; another is located on Bahrein Island for the employees of the Bahrein Petroleum Company; three theaters serve the populace of Dhahran, Abqaiq, and Ras Tanura, while three others furnish entertainment at the Trans-Arabian Pipeline camps.

As projectionist for International Bechtel, Inc., the writer is concerned with the Base Camp Theater at Ras El Misha'ab, approximately 175 miles northeast of Dhahran, and two line camp theaters.

The latter are at present outdoor in-

stallations, one being in a mobile camp, and the other at the site of a pump station. The mobile setup consists of two Simplex portable projectors, with Mazda lamps, mounted in a trailer. The screen is constructed on the site. The pump station has an outdoor booth housing two Simplex E-7's, Peerless Magnarcs supplied by rectifiers, and Simplex sound equipment. Pictures are shown on a large wooden frame screen.

The Base Theater is a Quonset structure with stage, conventional sound screen, and fireproof projection room. It seats approximately 225 persons in lounge and camp chairs. In wintertime the floor is cleared for occasional dances. The building is air-conditioned, as are all the main buildings in the camp. Projectors and sound system are DeVry

Navy Type "C," with Peerless lamps, rated at 50 amperes and supplied by Baldor Rect-o-Lites. At 90 feet throw, the screen image is 14½ feet in width.

Three programs per week are supplied by ARAMCO, and they are run two nights and one morning each. They are then forwarded to the line camps for single showings, after which they are returned to Dhahran, ARAMCO headquarters. All shipments are by air.

ARAMCO receives film in unmounted, single rolls from the various exchanges in Bombay. At Dhahran, the prints are mounted on double reels for use on the circuit, and are broken down again upon completion of the run. Most prints are fairly well worked, and footage is generally missing from the ends of reels, making it necessary to insert new cue marks in order to effect accurate changeovers.

Apparently the projectionists out in this part of the world have never heard of standards, for we have found cues 30 and 40 feet before the ends of some reels. There is often a bewildering display of

Larry Sabatino: Labor, Civic Work Win Unions Goodwill

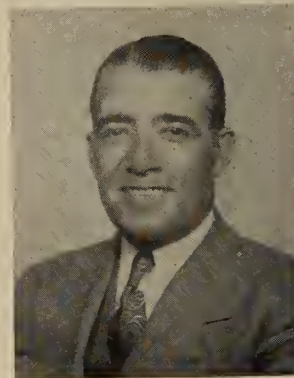
THE issuance recently of a Theatrical Mutual Associations charter to Westchester County, N.Y., focuses attention upon one of the most active workers in behalf of Labor not only in that alleged garden spot of New York State but almost anywhere else one would elect to name. Reference is made here to the organizer and first president of Westchester TMA Lodge 141—Larry Sabatino.

Larry is a member of IA projectionist Local 650 in Westchester, but his activities in behalf of Labor range far and wide and are by no means confined to the amusement field. In fact, one of his earliest chores was the organizing of the General Optical Co. of Mt. Vernon, N.Y., in the process of which he obtained a 15% wage increase for all its workers.

The need for a "press secretary" for two IA locals is not too readily apparent, but in filling this spot over a period of six years Larry has really made an impression on the Westchester populace by means of beating the drum long and hard about the civic contributions of the locals. One of his more recent tasks, admirably discharged, was the reorganization of the Westchester County Federation of Labor, of which he is now both the delegate and executive. He is also delegate of the Central Committee representing veterans of World Wars I and II.

Currently Larry is engaged on one of his biggest civic jobs as chairman of the Yonkers, N.Y., Community Chest, and he cockily proclaims that he will turn in a bang-up performance.

Larry Sabatino, of IA Local 650, organizer and first president of new TMA Lodge 141 in Westchester County, N.Y.



There are many other fraternal and civic activities in which Larry has engaged or in which he is now active, the list being much too long to include herein. What should be set down here, however, is that there are all too few union members of Larry's stripe, who in going out and tackling all manner of such chores reflect the highest credit upon and gain the greatest goodwill for their union.

'Ten Best' Films of 1949 in F. D. Poll

The "Ten Best" films of 1949 as reported by 416 critics to the annual *Film Daily* poll were: The Snake Pit (20th-Fox); The Red Shoes (Eagle-Lion); A Letter to Three Wives (20th-Fox); Champion (United Artists); The Stratton Story (M-G-M); Come to the Stable (20th-Fox); Home of the Brave (United Artists); Command Decision (M-G-M); The Heiress (Par.); and Pinky (20th-Fox).

the cue maker's art, ranging from simple holes and circles to fanciful figures and bits of paper.

All pictures are censored in India, and scenes of women drinking, long kisses, and violence are deleted.

Conditions a Bit Rugged

Living and working conditions out here are somewhat rugged, but all-in-all the arrangement is satisfactory enough and more rewarding in a financial way than comparable employment in the States. With about 450 persons working in the Base Camp, it is quite a community, and while recreation is at a premium, there are a number of activities available in addition to the aforementioned entertainment. There is a nine-hole golf course, good swimming at the nearby beach, baseball, a fair library, indoor games, a snack bar with beer and soft drinks, and even occasional dances.

Remote as it is, mail service is good, with air mail arriving from the West Coast in from four to six days. The latest news arrives via the *Rome Daily American*, *Time*, and *Newsweek*, and short-wave radio reception is fair.

It would be a pleasure to hear from any brother projectionists who might care to write, and should anyone care to ask further questions about our craft as practised out here, we shall be happy to oblige.

Basic Soundhead Dimensions in SMP&TE Reference File

Pointing out that the theater equipment industry has long been plagued with serious projector and soundhead interchangeability problems, the Society of Motion Picture & Television Engineers has just announced the availability of a publication intended to alleviate in some measure this serious problem. Says the Society statement in part:

"The lack of formal standards for such important details as size and location of mounting holes or dimensions and speeds of projector drive gears forces each manufacturer to provide a complete series of adapter kits to permit matching his equipment to all other combinations of projectors, soundheads, bases, magazines, preview attachments, etc.

"Because the problem is such a complex one, any real standardization is many years away; but for the time being, the Film Projection Practice Committee, under the chairmanship of L. W. Davee, has provided a measure of relief. They have assembled a combined reference file of the basic dimensions that affect interchangeability of 25 different types or 35-mm theater sound reproducers.

"Copies have been sent to the manufacturers who participated in the survey and they are now made available for purchase at \$10 for each set of eleven 24 x 36 inch blueprints."



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Four inch diameter Super Snaplites are available, to order, in focal lengths from five up through seven inches, in quarter inch steps. In all these focal lengths the true effective speed of f/1.9 is maintained. Four inch diameter Super Snaplites are also available, to special order, in focal lengths longer than seven inches, at somewhat slower speeds.



Get the full facts of this superlative new lens now—write for your copy of Bulletin No. 209 today!

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Optical **CORPORATION**



Kodak's New 'Model 25' Heavy-Duty 16-mm Projector

A NEW heavy-duty 16-mm projector, designed from the base up for auditorium and large group purposes, has just been announced by Eastman Kodak Co. Although reasonably portable, the projector, Model 25, is intended for permanent installation. If it is necessary to move it, however, the projector can be easily disassembled into three

parts, each of which is provided with handholds.

To attain a new level of durability and quietness, the mechanism of this new projector is divided into two mechanically independent but interlocked assemblies: the intermittent assembly and the shutter-sprocket system. These are driven by separate synchronous motors.

Individual motors also drive the blower, takeup, and rewind.

The entire projector is designed on a mechanical unit basis for greater efficiency and ease in serviceability. Thus, the lamphouse is one unit structure; the intermittent system another, etc. Any of the ten major components of the projector may, as a result, be easily removed for service.

Following standard 35-mm practice, an intermittent sprocket is used instead of a claw-type, pull-down mechanism. Positive and accurate film transport is provided by an 8-frame sprocket driven by an accelerated Geneva star. The two-interruption-per-frame shutter has a light transmission of 65%.

Equipped with a 1000-watt, 10-hour tungsten lamp, the Model 25 delivers considerably more screen illumination than has been possible previously with 16-mm equipment. It has also been designed for use with arc illumination under more stringent projection condi-



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For as little as a penny a week per car station, this plan is available to every RCA equipped Drive-In theatre on RCA Contract Service. Rates are arranged on either a weekly or monthly "seasonal" plan—whichever meets your needs.

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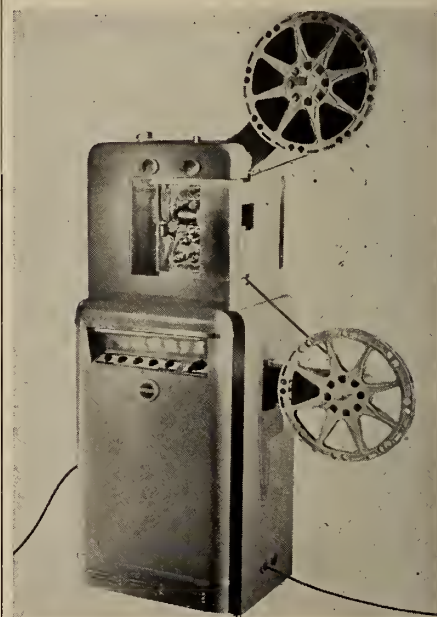
- Assures you that all your In-Car equipment will be in top condition for the new Spring season—and be kept that way.
- Provides periodical check-ups throughout your season.
- Assures prompt and reliable service.
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- Enables you to budget upkeep costs.



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CAMDEN, NEW JERSEY



New Eastman Kodak Model 25 heavy-duty 16-mm sound and visual projector.

tions. Sufficient illumination is provided by the arc lamphouse to achieve optimal screen brightness and to fill a screen having dimensions which are twice those allowable when the tungsten lamphouse is used.

Greatly Improved Optics

The projector is being offered with a new type of lumenized Kodak projection lens specially designed to give excellent flatness of field and image resolution. This lens is offered in a choice of focal lengths: 2, 2¼, 2½, and 3 inches. All lenses have an F:1.5 aperture.

In the tungsten model, a dual lamphouse incorporated in the projector prevents show interruption if a lamp burns

out. A quick turn of the switch puts the standby lamp in position and gives instant operation. A new base-up lamp is used to give greater precision of filament location and better light maintenance throughout the life of the lamp.

The sound optics in the new projector are of new design to insure improved signal-to-noise ratio. A two-stage pre-amplifier is integral with the photo-cell and feeds into a separate main amplifier. The amplifier system and speaker are manufactured by Altec-Lansing. Flutter is reduced to 0.2% rms.; inter-modulation distortion to 5%.

The controls for the projector are simple and are located in a well-lighted panel built into the pedestal. Besides the usual tone and volume controls, a switch provides for phonograph or microphone input. A 4-position power switch serves the projection mechanism. Two knobs on the outside of the projection head provide for easy focusing and framing. A 603B Altec speaker is standard equipment for small audiences; an Altec 800 for larger groups.

Theater Divorcement Order in Anti-Trust Suit Entered

FINAL judgement in the anti-trust suit against motion picture producer-distributor-exhibitor companies has been handed down by the U. S. District Court in New York City. Loew's, Inc., Warner Brothers, and 20th Century-Fox must submit within six months a plan for the divestiture of their theater holdings, and the entire job of divorcement must be completed within three years.

Following are those portions of the court's decision which are of particular interest to the theater field:

1. Within six months, 20th Century-Fox, Warner Bros. and Loew's, Inc., shall submit a plan for ultimate separation of their distribution and production business from their exhibition business, with final divorcement to become effective on Feb. 8, 1953—three years from the day the decree was entered.

Distribution-Exhibition Ban

2. Within one year, the defendants and the Department of Justice shall submit a list of theatres which must be divested to satisfy requirements of the Supreme Court.

3. No distributing company resulting from the divorcement may engage in exhibition of pictures and no exhibition company created through divorcement may engage in film distribution except on permission granted by the court, upon a showing that "such engagement shall not restrain competition in the distribution or exhibition of motion pictures." This apparently is designed to enable the new distribution companies to acquire

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showcases they contend is essential to a successful operation.

4. No exhibitor company resulting from divorcement may acquire directly or indirectly any interest in any theater divested by another defendant.

5. The defendants are restricted from acquiring any new theaters unless it is shown first to the court that the acquisition will not restrain competition in exhibition, or the new theater replaces one lost through physical destruction, expiration or cancellation of a lease under which such a theater is held, or disposition other than dispositions made in compliance with the decree.

6. For the purpose of securing compliance with the decree, the Department of Justice is permitted reasonable access to records of the defendants and to interview personnel as well as to request written reports as may be necessary for compliance.

Technicolor Ups Print Capacity

Increased laboratory facilities, costing \$3½ millions, will enable Technicolor to increase its U. S. production to at least 50 pictures during 1950, an increase of 10% over the 1949 output. Additionally, the Technicolor plant in England will process 15 features this year.

Notes on Effective Tv Pictorial Composition

An excerpt from "Motion Picture Films in Television," compiled by Eastman Kodak Company.

FOR Tv studio photography, either 35-mm or 16-mm professional or professional type motion picture cameras operating at the standard sound speed of 24 frames per second or 90 feet per minute (36 feet per minute for 16-mm film) may be used. Whenever synchronized sound is to be recorded as part of the production, cameras must be driven with synchronous or interlock motors.

At the present time, the best picture and sound quality is obtained when 35-mm film and equipment are used throughout the process. The use of 16-mm film, with its smaller dimensions, imposes more severe restrictions on equipment as well as on the film characteristics and processing requirements. Certain bottlenecks have been created in the 16-mm program which are largely responsible for the difference in the quality of results obtained.

In the series of steps employed in the reproduction of a film image on a receiver screen, there is inevitably a certain amount of cropping of the picture area. Some of this occurs in making

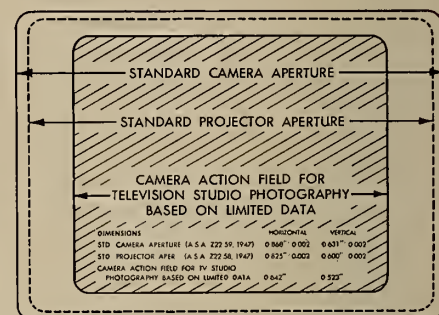


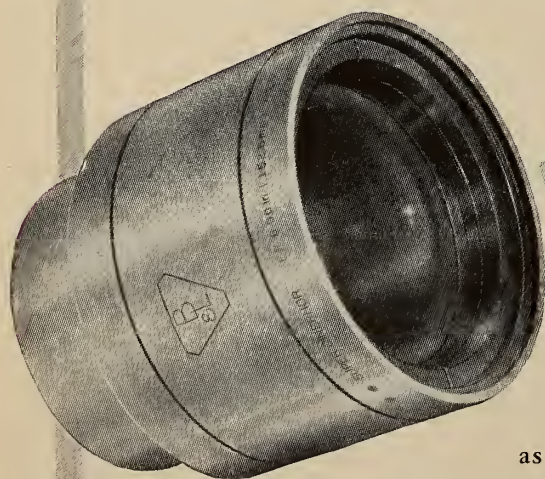
FIG. 1. Standard 35-mm camera and projector apertures and camera action field for Tv studio photography based on limited data.

the print, some in transferring the image to the television mosaic, and some at the receiver screen.

In the latter case, variations in design of the mask (screen opening) for various types of receivers may result in some vignetting. Receivers which permit some adjustment in the image magnification may also cause vignetting, depending on individual tastes in monitoring. There is some justification, therefore, in confining the subject material and sig-

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nificant action to a camera finder area which is somewhat smaller than that used in making films for normal projection use. Under these circumstances, all important information would then be seen on the majority of commercial receivers.

Thus far, no standard has been established to specify the exact camera action field for Tv studio photography. One Tv station has reported that this camera action field should be about $8\frac{1}{2}\%$ less for the top and bottom margins and about 13% less for horizontal margins as compared with the standard camera finder area.

An appreciation of the dimensional areas involved may be obtained from Figs. 1 and 2. In Fig. 1, the outer solid line shows the standard camera aperture, which is also defined in the camera finder, for the 35-mm sound motion pic-

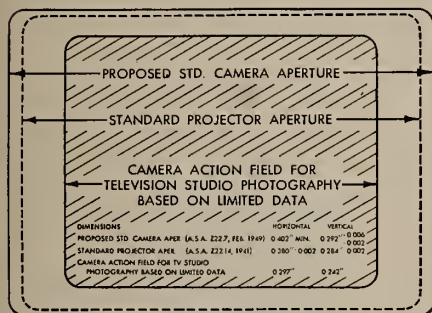


FIG. 2. Sixteen-millimeter camera and projector apertures and camera action field for Tv studio photography, based on limited data.

ture camera, as covered by the American Standard Z22.59, 1947.

The dotted line shows the standard projector aperture (American Standard Z22.58, 1947), while the cross-hatched area shows the limits of the camera action field for Tv studio photography, as based on the available limited data given above. Fig. 2 shows the corresponding areas for the 16-mm sound motion picture equipment.

'Apparent Definition'

Subject matter should be photographed as large as possible, but should not unduly crowd action and movement of the characters. The most pleasant reproduction on the receiver screen is obtained from close-ups, and they should therefore be used as frequently as possible. Medium shots give just acceptable reproduction, while long shots give rather poor reproduction.

It is necessary, of course, to include some long shots in order to obtain the essential continuity in terms of transition, location, and dramatic telling of the story. Furthermore, the inclusion of long shots gives the psychological effect of making the observer believe that the definition is better than reality would

warrant, an effect known as *apparent definition*.

The need for numerous close-ups is emphasized if one constantly visualizes reproduction in terms of the small viewing screen. On the average, most receivers at present are equipped with rather small screens as compared with screens commonly used for projection of home movies.

The range of brightnesses which can be reproduced as satisfactory tone scale values is also much less than is the case for home movies. The producer should strive, therefore, to avoid the so-called "tunnel-viewing" effect and earnestly try to carry the viewer into the picture.

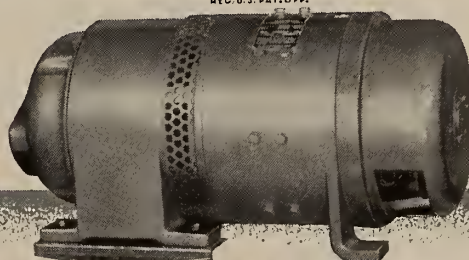
NEWS PROJECTIONS

Jottings of happenings which, while mostly of a non-technical nature, have a bearing upon general industry welfare and progress.

GROSS receipts of motion pictures theaters in 1949 were only off 1% from those of 1948, if figures just released by the U. S. Dept. of Commerce are any indication. Theater owners do not lend complete acceptance to such figures, however, for three reasons: other general admission events are included; the increase in the number of theaters is

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not reflected therein, and declining collects and increased costs mean an even greater drop in profits. . . . Anti-trust consent decree signed by Technicolor requires company to license 92 patents on a royalty-free basis and make available on a "reasonable" royalty basis 12 others, 48 patent applications and all patents applied for until Nov. 28, 1953. Technicolor must also furnish, until Jan. 1, 1957, the "know-how" to all licensees who pay a reasonable royalty. Also, all contracts conditioned on the sole use of Technicolor equipment can be terminated. Also, it must furnish specs of its three-strip camera to applicants desirous of manufacturing it and make available two cameras for rent to all comers.

Net profit of \$3,189,000 for the three months ending Nov. 26 last is reported by Warner Bros. Figure is \$100,000 more than comparable period in 1948. . . . Theater owners are practically unanimous in declaring that they will pass along to the patron any benefit resulting from a possible cut in the admission tax. . . . TESMA will up the number of exhibition booths to 125 for its next convention Oct. 8 at the Stevens Hotel, Chicago. . . . Paramount promises to let the FCC have a "big eyeful" of good big-screen Tv in color at the next Commis-

sion hearing on theater Tv. . . . New York stores advertising Tv sets on deferred payments for as "little as \$1.25 a week, which is less than the price of two tickets for a good movie." Picture companies jumped newspapers and radio stations carrying such copy. . . . A total of 504 features in 1950 are anticipated from major and independent producers in Hollywood. . . . Society of Motion Picture & Television Engineers announces that while it is "neutral" as regards any particular method of establishing theater Tv, it will lend its "good offices and advice" to anyone concerned with establishing such a system.

New York Paramount Theater, with Bob Hope and Jane Russell as in-person attraction, did an all-time Saturday-Sunday business of \$52,000. . . . Fanchon & Marco, St. Louis exhibitors, inaugurated plan to admit children under 12 years of age without charge when accompanied by their parents. . . . Eastman Kodak net earnings for 1949 were \$49,770,699. . . . Net income of 20th Century-Fox for 1949 announced as \$12 millions. . . . Four independent Boston film exchanges operating under one roof have been slapped with a permanent injunction to prevent them from working employees more than 40 hours weekly.

THE PRESENT TREND IN DRIVE-IN THEATERS

(Continued from page 17)

account for about 25% of the gross income.

Each year rapid strides are manifest in drive-in theaters. There is now available a highly scientific modern toll system, a modification of collection systems used at the largest bridges and tunnels, which is a substantially foolproof method of collecting and recording toll receipts, at the same time eliminating the use of tickets.

Glamour prevails in many drive-in theaters, featuring lighted waterfalls over the rear of the screen tower, beautiful landscaping, and ultra modern concession stands. In fact, everything is being put into drive-in theaters which experience indicates the public likes with their outdoor movie entertainment.

Careful Planning Required

It thus becomes obvious that the selection of a location, the planning and the construction of a successful drive-in theater require the assistance of an experienced consultant well informed on the many complex problems which are involved. Unforeseen costs resulting from mistaken judgment on the part of inexperienced builders can force undesirable economies in the selection of the most essential elements of the over-all enterprise, namely, the projection and sound equipment.

The prospective investor in a drive-in theater needs to be informed as soon as possible that the return on his investment has a much better chance of attaining his expectations if the policies of good business practice are consistently maintained, rather than an attitude of trying to build and equip a drive-in theater as cheaply as possible.

On the assumption that the drive-in theater has been so planned and constructed that each occupant of every parked automobile can see the picture on the screen, it follows that the quality of the projected picture and reproduced sound is without exception a prime requisite for entertainment enjoyment.

Screen Light Level

Ever since the first drive-in theater was constructed, the question of the amount of light on the screen has been the main bottleneck of this type of theater. It has been not too many years since a 30-foot screen was considered large for indoor theaters. Today, there are a great many drive-in theaters where screens are 60 feet wide or larger.

The average patron may have the feeling that when we double the width of the screen, we should correspondingly

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double the amount of light available. Unfortunately, however, since we are talking about screen area, instead of doubling the amount of light we have to multiply it by four to retain the same light level over the total area of the screen.

This crying demand for more light on drive-in screens has resulted in more powerful arc lamps. In general, as the amount of light at the aperture increases, a point is finally reached beyond which it is dangerous to go because of the damage to the film. Certain manufacturers have introduced heat filters which may remove approximately 40% of the heat with a 20% loss in light.

Questions Filter Efficiency

Frequently, it is found that excessive costs for both carbon and power consumption can be avoided by reducing the operating amperage and eliminating the heat filter without decreasing the light on the screen. In other words, there is no point in having a high light level only up to the heat filter and then having

a 20% loss in light, unless the over-all amount of light transmitted to the projector is appreciably higher than would be the case of the whole setup operated at a lower amperage without a heat filter.

One other important feature is that a heat filter may have a 20% loss in light on the day of installation, but this light loss may appreciably increase as time goes by, due to two causes: (1) the efficiency of the heat filter may decrease with age; and (2) dirt on the surfaces of the heat filter will reduce its light transmission.

Consequently, a heat filter is a unit which is continuously getting worse with age. In general, then, very much more effective operation can be obtained if a conventional heat filter with its light absorbing properties can be omitted.

There are two general classes of arc lamps currently used in drive-in theaters: (1) the reflector type, using approximately 80 to 85 amp on a 9-mm black high-intensity positive carbon; and (2) condenser-type arc lamps, using amperages ranging from 130 to 180.

Drive-in Amplifier Systems

The essential difference between the amplifier systems designed for drive-in theater use and those for indoor theater use is the higher audio power required for distributing peak signals without distortion to large numbers of in-car speakers, often totaling 1000 or more.

A typical drive-in theater amplifier has a total power output of 250 watts. It is a dual-channel system with the inputs connected in parallel but with the output from each channel connected to one-half of the total number of in-car speakers.

At the top of the amplifier rack is the terminal strip for making external connections. Directly below is the channel selector switch and test panel. Next follow the two voltage and two 125-watt power amplifiers.

Voltage, Power Amplifiers

The amplifiers can be turned down on their hinges for easy access to the circuits when servicing. The channel selector switch makes it possible to operate with both channels simultaneously as a dual channel system or, in the event of trouble in either channel, to switch the entire speaker load onto the output of the operating channel. At the same time, this switch changes the output transformer tap to match the speaker load. The disabled amplifier is automatically disconnected from the a.c. power source and the output load, so that it can be repaired without interrupting the performance. Monitoring and testing facilities are also included on the selector switch panel.

The voltage amplifiers are two-stage

units having high impedance inputs and transformer-coupled outputs. The sound-heads are connected to the inputs by means of low-capacity cables. Coupling between the voltage and power amplifiers is accomplished through a 500-ohm "H" type variable attenuator which serves as the volume control. The attenuator is connected as a dual 250-ohm variable "T" attenuator so that both channels are equally controlled.

The power amplifiers are three-stage Class "B" units utilizing four 809-type tubes in the output stage and are rated at a 125-watt output each with less than

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3.5% distortion between 50 and 5000 cycles. Approximately 10 db feedback between the output and driver stages contributes to holding the distortion to this low value, and also serves to hold the output level substantially constant with variations in speaker load.

A ramp station comprises two speakers and a junction box. The speaker housings are of die-cast aluminum, rugged enough to withstand being run over by an automobile without crushing. They are small in size and light in weight and are easily handled with one hand.

The hook or neck construction was

designed so the speaker can be hung on the car window, with the window almost closed, as would be necessary in rainy or cold weather. The volume control knob is of bright red plastic and is tamper-proof. A simple rheostat volume control is used in the voice coil circuit of the speaker.

Drive-in Speaker Mechanisms

The mechanisms used in these speakers are especially designed for drive-in use. All metal parts, including the magnets, are heavily plated with cadmium. The magnets are anchored to the frame

so that they cannot shift and cause the pole piece to move off center. The voice coil and diaphragm are waterproofed and constructed to withstand all outdoor weather conditions, including floods. A drive-in theater in Endwell, N.Y., was under water for three days, submerging all of the speakers and junction boxes. When the theater was finally reopened, all but three of the speakers played perfectly.

The junction boxes are also of die-cast aluminum and have the same type of finish as the speakers.

The post and road light gives a cone of light at the base of the post and projects an adjustable beam of light out into

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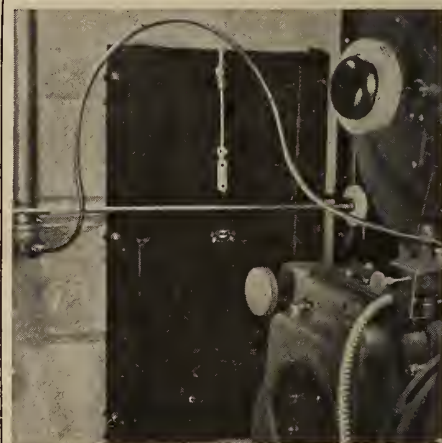
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The non-operating, or gear side of a projector in a drive-in theater, showing the path of the compressed airline from the front wall to the projector. Another airline is hooked-up to the film side of the mechanism.

From the wall the airline is reduced to 1/4-inch copper tubing. The hump shown in the tube, as it curves upward and down to the projector, serves two purposes: (1) it provides flexibility of the tubing to absorb vibration and to permit any possible change in projector tilt, and (2) affords the projectionist unobstructed access to the side of the projector at the front.

the driveway in the shadow area between the rows of parked cars. The junction boxes are available with or without this feature.

The miniature 28-volt, .17-amp lamp is supplied by a 32-volt power transformer located in the projection room, with the voltage dropped through specified line resistors. The lamp was designed for airplane use and has a rugged shock-proof filament assuring long life. This type of lighting eliminates any apprehension on the part of the automobile driver who is obliged to turn off his headlights on driving into the theater. There can be no fear of hitting an unseen person or object, because each roadway light serves continuously to usher the driver safely toward a parking space.

The pattern of elongated lighted areas in the roadway follows the curved contour of each ramp. The over-all effect, including the lighted areas at the base

of each post, gives the drive-in theater a beautiful appearance, with ample lighting within the parking area at a minimum of cost. In a 1000-car theater, for instance, there are 1000 beams of light from 500 tiny lamps with a total power consumption of only approximately 2 kw.

The transformer is completely moisture-proof. It has a high impedance primary winding which permits connecting many in parallel across the amplifier output.

For concession service, an additional miniature lamp is installed in the junction box which is readily seen by the concession attendant as a red glow from a lens located in the junction box cover. The patron controls the light by means of a toggle switch installed in the face of the speaker housing.

Three types of speaker cables take care of basic requirements. There is the low cost straight cord, and the deluxe Koiled Kord. A theft-resisting cable includes a hardened stranded steel cord which is anchored at both ends. It also includes three conductors and is standard for use with electrical concession lights.

Another type of concession signaling device is entirely mechanical. It is simply a stainless steel slide attached to the under part of the junction box base and so constructed that the patron can push or pull it and cause a red lens to intercept the down light beam of the post light, causing it to change from white to red. The lens is plainly visible to the concession attendant.

Some Unsolved Problems

The problems of daylight projection involved in endeavoring to obtain longer daily operating hours, and of in-car heating so as to expand the operating seasons, are apparently being given much thought. They both need a practical solution applicable to every section of the country. Fog is a serious problem in some areas, occasionally becoming heavy enough to cause refunding of admissions.

Regardless of such remaining problems, there is every indication that the public needs and wants more drive-in theaters, if strategically located, wisely constructed, and properly equipped.

The trend is toward drive-in theaters having smaller car capacities which can adequately serve rural or suburban communities. Many have already outgrown their car capacities. The solution has been simple and economical in those theaters owning sufficient land. It has been necessary only to add and equip one or more ramps.

All of these activities are conclusive proof that the drive-in theater business is here to stay. Exhibitors were literally pushed into it as an aftermath of World War II. In the opinion of the author, only a World War III can be its Nemesis.

THE 35-mm PROJECTION POSITIVE FILM

(Continued from page 16)

film itself, and is *permanent*, i.e., it lasts for the life of the film.

The five principal steps in making a film splice in a projection print are as follows:

1. The ends of the films to be joined are cut square; one of the stubs (stub A) being cut along the middle of a frame line, and the other (stub B) on a line halfway between the first and second sprocket holes above or below a frame line.
2. The emulsion and gelatine substratum of the overlapping stub (stub B) is scraped off, usually with the aid of moisture, to the middle of the frame line.
3. A liberal quantity of film cement of the proper type is applied to the scraped area.
4. The stubs are immediately joined in

overlap and held together under firm, evenly distributed pressure.

5. A few seconds are allowed for the cement to "set," thus concluding the splicing operation.

The following quotations cited from three different sources warrant special attention:

A. "Much film is ruined by poor splicing. Splices that are wide, stiff, buckled, or out of line cause the film to jump the sprockets so that torn perforations or breaks result. Perforations in the vicinity of a splice of this kind are always strained or broken. Stiff and buckled splices are caused by making too wide a splice, too liberal application



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New York 63, N. Y.

of (thickened) cement, or both. The use of poor quality cement may result in splices pulling apart, especially in the film gate or trap. This constitutes a hazard, therefore all weak splices should be remade before projection.

"Precision splicing equipment is desirable, as it is difficult to make a good splice unless the scraper is accurately guided. However, it is important that the splicer, regardless of type, be kept in the best possible condition. Fresh cement, proper scraping, and sufficient

pressure are absolutely essential for making satisfactory splices."⁴

B. "Incredible though it seems, there are thousands of theaters in which projectionists are required to effect repairs on film without the aid of mechanical splicers. Now, although a well-made hand splice is nearly as strong as a machine splice, it is apt to buckle and, unless the soundtrack has been "blooped" with movietone lacquer, it produces a thump, or click, in the speakers. Moreover, exact registration of the perforations is a matter of chance, so as likely as not the screen image will jump when a handmade splice passes through the gate.

Basic Splicing Rules

"But whether splicing is done by hand or by machine, certain basic rules must be observed if the splice is to provide a smooth joining and is to last for the life of the film.

"The scraping must be thorough. Moisten the stub a second time and wipe it with a cloth to remove adhering traces of gelatine. The celluloid side of the film should be wiped free from oil. Film cement should be applied liberally, and the film should be left in the splicer not less than 5 seconds or longer than 10 seconds (the exact time depending on the type of cement used and the type of film being spliced), for too long a time in the splicer will unfailingly cause the edges (transverse) of the splice to be weakened by the solvent action of the cement squeezed out by pressure. Some cement is bound to be squeezed out if a sufficient quantity has been applied.

⁴ "Causes and Prevention of Damage to 35-mm Theater Release Prints," by the Research Laboratory of the Eastman Kodak Co.; IP for October 1948, p. 5.

"Slight roughening of the scraped surfaces increases the strength of the splice. The splicer must be adjusted so that the stub is scraped to the precise required width. A transparent line across the film, caused by scraping too great a width, produces a click in the sound and may also weaken the splice; while, on the other hand, a strip of emulsion left under the joint may cause the splice to lift and tear in the projector."⁵

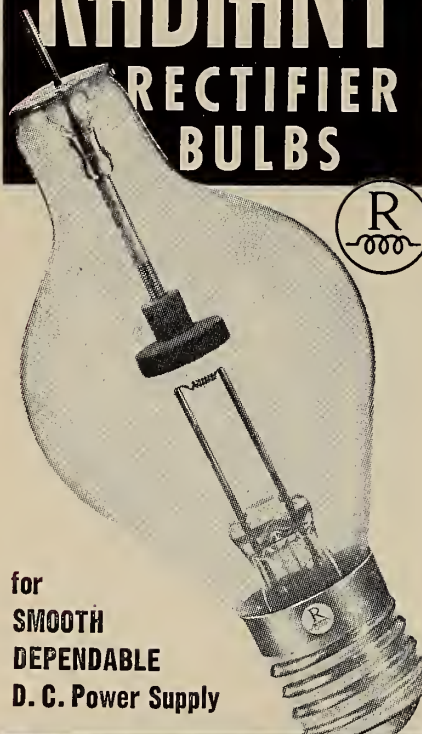
C. "It is advisable (when scraping the emulsion from the film stub) to work from the center of the film frame toward each edge, rather than to make one continuous scrape the width of the frame . . . After the emulsion has been removed, be sure to scrape off the invisible binder layer (i.e., the substratum of clear gelatine) until the rough white surface of the base evidences no gloss by reflected light. It is especially important that the area around the perforations and at the ends of the film be perfectly clean.

"After the shearing operation, lift the splicer clamp just a trifle for applying the cement, thus keeping the plate as clean as possible. Apply the cement in one firm, continuous stroke with the brush, as opposed to a 'lathering' up-

⁵ "Projection-Room Handling of Prints," by Robert A. Mitchell, IP for March 1948, p. 5.

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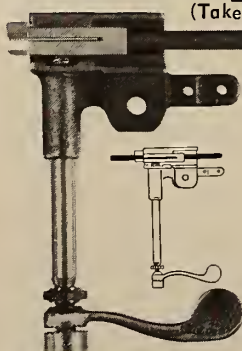
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and-down motion. This latter tactic utilizes excess cement, and will only cause trouble, usually a 'bumpy' patch.

"Once the cement is applied, it is important that the pressure clamp be brought down *immediately*: lower it slowly but firmly instead of with an abrupt clamping-down, which tends to splash the cement and thicken the splice.

Splicing Duplitzed Prints

"The removal of the sub-layer is somewhat more critical on safety than on nitrate base and requires close attention on the part of the projectionist. Duplitzed film, whether safety or nitrate, has emulsion on *both* front and back surfaces and is much more difficult to splice than single-coated stock. All duplitzed films (Trucolor, Magnacolor, Cinecolor, etc.) must have *both* emulsions and *both* sub-bases scraped . . . before a secure joint can be made."⁶

FILM cements are not glues or mucilage-type adhesives. They are *solvents* of film base, and are able to join two pieces of film by softening them so that they flow together and harden to form a *weld*.

There are many solvent chemicals which may be used in the formulation of

⁶ "Safety Film: Projection Factors," by Henry B. Sellwood; IP for November, 1948, p. 9.

film cements. Following are some of the simple solvents which can be used alone as film cements for the various types of film.

Nitrate film: Methyl alcohol, acetone, methylethyl ketone, "cellosolve," methyl "cellosolve" acetate, diacetone alcohol, glacial acetic acid, ethyl acetate, isoamyl acetate, and butyl acetate.

Diacetate (old-type) safety film: Acetone, methylethyl ketone, methyl "cellosolve" acetate, diacetone alcohol, dioxane, glacial acetic acid, and chloroform.

Triacetate (high-acetyl) safety film: Diacetone alcohol, dioxane, glacial acetic acid (especially when warm or mixed with other solvents), and chloroform.

Most film cements however, are *mixtures* of several solvents in which a small quantity of film-base material has been dissolved.

Multiple Solvents Desirable

Two or three solvents mixed together are usually more effective than any of them used singly. Film-base material is usually dissolved in the solvent mixture to increase the viscosity of the liquid, to hasten the "biting" and "setting," and to permit stronger splices to be made by preventing an excess of film-base from being dissolved and subsequently lost when it squeezes out from the join.

Occasionally a trace of some "plasticizer" such as castor oil, camphor, butyl phthalate, or tricresyl phosphate is added to insure supple, non-buckling splices which retain their strength and flexibility indefinitely.

Only the kind of cement compounded for the type of film being spliced should be used—regular nitrate cement for nitrate film, triacetate cement for high-acetyl safety film, and "double-purpose" cement for either type of film or for both in mixed splices. Film cements made for the old-type diacetate safety film should not be relied on for splicing the new high-acetyl (triacetate) film.

Only small quantities of film cement

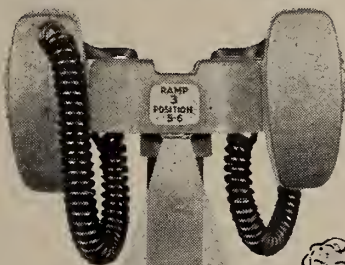
(no more than one pint) should be kept on hand, as some types are chemically unstable and deteriorate with age. Stock bottles should be kept tightly stoppered at all times, and, most important of all, the dispensing bottle kept on the film-rewinding bench should not have a capacity greater than one fluid ounce.

Nearly all film cements are hygroscopic, readily absorbing water vapor from the air. The frequent exposure of the cement in the dispensing bottle to the air allows moisture to be taken up by the fluid, and also permits certain of the solvents to evaporate, thickening the liquid and changing its composition.

Film cement which contains moisture and dirt, or which has lost a large percentage of the more volatile of its ingredients, is manifestly unfit for use.

In the early days of the projection art, it was not unusual for the projectionist

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to make his own film-joining mixtures, commercial ready-mixed cements being practically unknown. But nowadays most projectionists use the commercial products in order to avoid the trouble of obtaining separate solvent liquids and mixing them together in the most satisfactory proportions.

Reconditioning, Storage of Film

The "rejuvenation" of absolutely worn-out film is an utter impossibility. The most that can be done to salvage a worn-out print is to reprint it anew on fresh raw stock—a delicate procedure when the original negative is unavailable, thus making it necessary to prepare a duplicate negative from the damaged positive.

As a rule, projection prints may be maintained in good condition for a surprisingly long time by frequent inspection and prompt correction of all discoverable defects: (1) weak splices (2) torn and cracked perforations (3) torn and roughened edges (4) scratches (5) the presence of dirt and oil and (6) brittleness. With the exception of 4, 5, and 6 these repairs have been discussed in connection with the inspection and repair of prints in the projection room.

Scratches cannot be removed from film, of course, but if they are not too deep, the "rainy" effect they give on the screen (together with surface noise in the sound) can be mitigated slightly by cleaning the film to remove the grime which has accumulated in them. When only a few feet of film are defaced by deep scratches, the defective portions of film may be removed or, if this is not feasible, the scratches may be painted over with black Movietone lacquer in the dark portions of the image. The latter expedient is most valuable on "fades."

The type of defacement caused by "sprocketing" is irremedial and film having sprocket marks in the soundtrack area is definitely unusable.

Cleaning Reels of Film

The cleaning of entire reels of film requires special film-washing and polishing machines, and should never be attempted in the projection room unless the proper apparatus be at hand. These machines wash the film in *clean* carbon tetrachloride and subsequently polish the film by applying a carbon-tetrachloride solution of carnauba wax and buffing.

The cleaning of film by drawing it through a pad of cloth moistened with carbon tetrachloride is not recommended except for very short lengths of film to which extra time and care may be devoted. The pad becomes dirty very quickly and serves only to scratch the emulsion and merely redistribute the oil and dirt on the film without removing very much of it.

The brittleness of old nitrate films cannot be wholly remedied, but a substantial measure of tensile strength and pliancy may be restored to the film by storing the film for a sufficient length of time in a vault or air-tight can (film "humidor") in which specially treated blotting paper has been placed.

The blotting paper is prepared for this purpose by wetting it with an acetone solution of camphor and, when the acetone has evaporated, leaving a deposit of camphor crystals in the fibers of the paper, moistening it with plain water or, better, a dilute solution of glycerine in water to prevent too rapid drying.

The camphor solution is made by dissolving a ½-ounce block of camphor in about 4 fluid ounces of acetone. A suitable glycerine solution is made by mixing 1 fl. oz. of glycerine with 4 fl. oz. of water.

The camphor-impregnated blotter should be definitely moist, but not dripping wet. The moist, camphoraceous vapors given off by the humidor blotter will also benefit safety films.

'Hardening' Bath for Film

The emulsion of film which has been exposed to ammoniacal or alkaline fumes may have become too soft and sticky to permit projection of the film. This can be remedied by treating the film in a "hardening" bath consisting of:

Formaldehyde (37%)	3 fl. oz.
Potassium carbonate	3 oz.
Water	1 quart

If the emulsion is hardened too much,

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however, the film will be so brittle that it cannot be bent sharply without snapping it asunder.

There is little to be said concerning the long-term storage of film. Temperature and humidity are important factors in successful film storage. Tests have proved that film keeps best at about 50° F. (10° C.) and in an atmosphere containing about 50% relative humidity. Nitrate prints stored under these ideal conditions will retain good projection quality for about 50 years; and it has been estimated that high-acetyl safety film will last for about 1,000 years.

The writer has a few reels of nitrate film about 15 years old and projected hundreds of times. These have not been stored under favorable conditions, yet the films are still flexible and tough and give excellent screen results. The longitudinal shrinkage of these films is about 0.7%.

[To be Continued]

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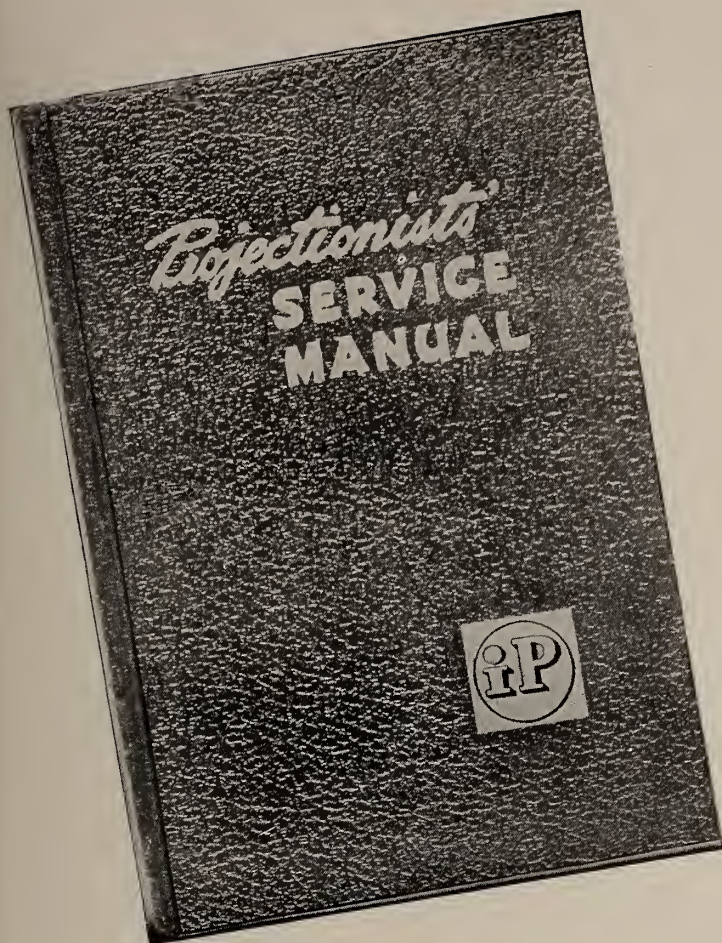
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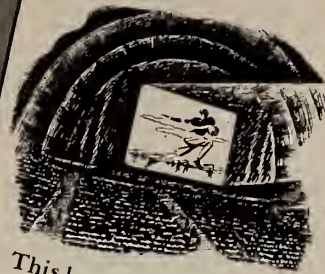
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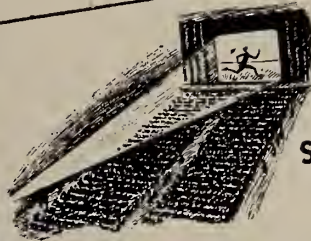
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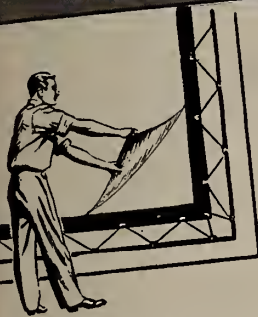
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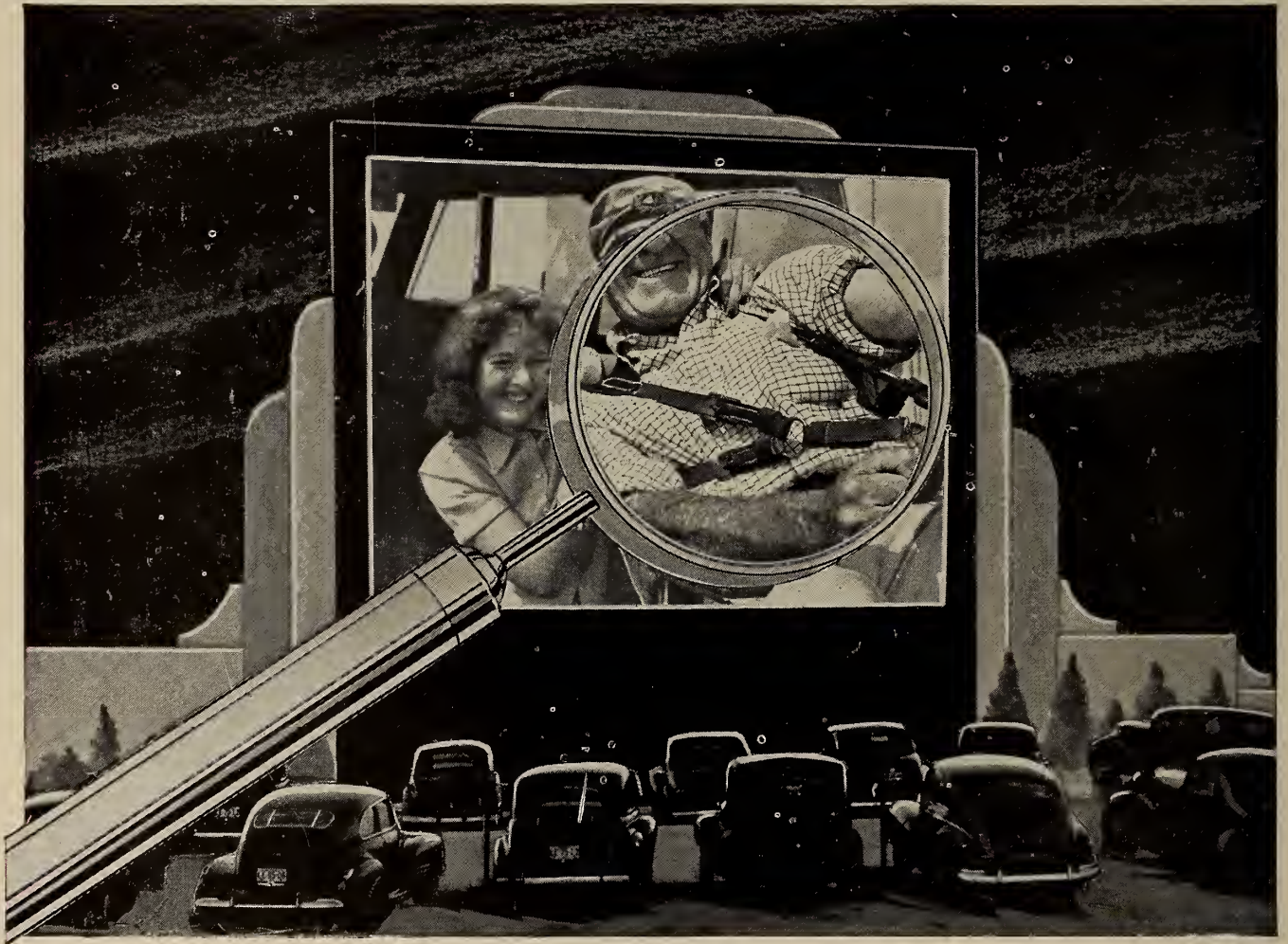


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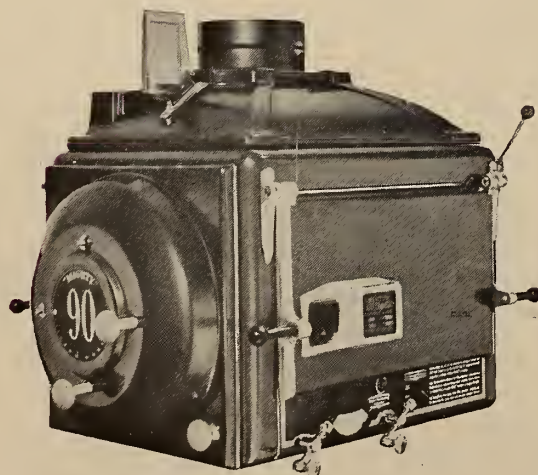
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HENRY B. SELLWOOD, *Editor*

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APRIL 1950

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MONTHLY CHAT

SIX MONTHS have passed and there still has been no concerted action by the projection field looking toward the solution of the vexing problem of excess heat upon the film. Along about last September, when IP finally succeeded in getting a representative group of manufacturers to publish their views on this topic, there was some justification for high hopes that this question would be approached directly and would be resolved by the honest, objective effort of all concerned working toward a common goal and for the common good. The intervening months have been productive of nothing that justified this early optimism.

Understandably, the manufacturers of film stock and of projection equipment—projectors and lamps—hold to widely varying views as to how best to minimize the ill effects of excess heat upon the film at the projector aperture; but this difference of opinion serves only to make more imperative a meeting of minds in an atmosphere of unselfish cooperation to the end that the projection process be rid of this serious deterrent to the presentation of a good show.

On page 17 of this issue there appears a most interesting discussion of various aspects of this problem—"Heating of Film by High-Intensity Arcs," by Hugh McG. Ross. Although this article is concerned in the main with process projection work, it constitutes an important contribution to the literature on this topic. Moreover, it proves that our British colleagues, unlike their American counterparts, are not adverse to meeting an issue of this nature head-on, let the chips fall where they may.

Whether the ultimate decision favors the use of glass filters, water-cooled carbon jaws, water-cooled apertures, or an air blast directed at the film in the aperture—or any combination of these—IP fails to see where the final choice, if effective, can occasion much concern to the individual manufacturer in terms of either profit or prestige. The important thing is that they get together on this issue—a step which they steadfastly refuse to take.

Projectionists are in no position to develop satisfactory units of this nature, more's the pity, since they do not have the facilities necessary for the mechanical and other work involved therein. In this situation they are wholly dependent upon those manufacturers who, having been the recipient of years of patronage and expert handling of their equipments, should be willing to contribute the little work and comparatively small expense which would go far toward the solution of this problem.

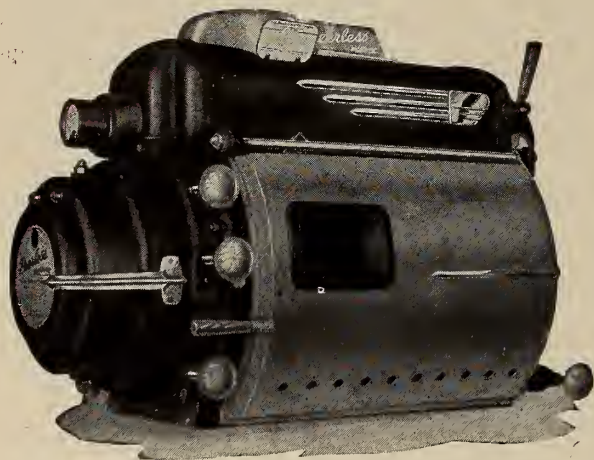
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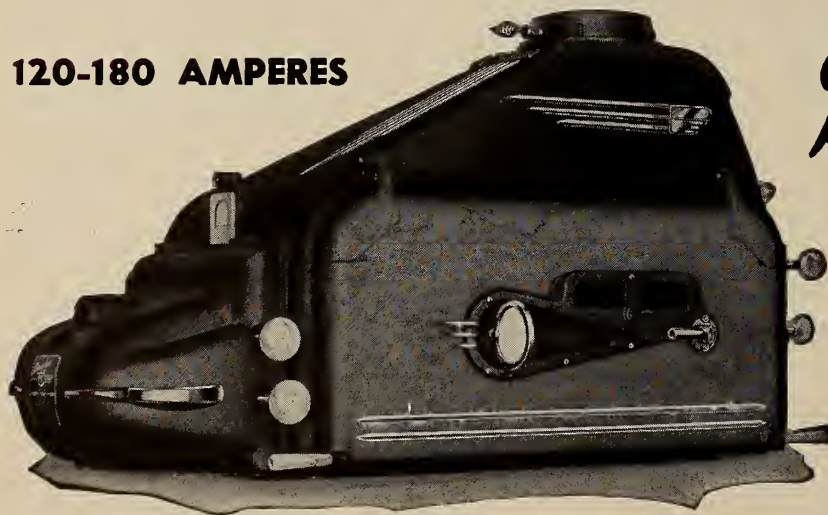
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By ROBERT A. MITCHELL

VI. The Genesis of Standard Film

VARIOUS animated-picture devices had been made and were widely distributed many years before the idea of commercial, or theatrical, motion pictures had occurred to anyone. Many of these demonstrators of optical animation were mere toys, but each was given a high-sounding name coined from Greek and Latin roots. Thus we read in every early history of the motion picture art of thaumatropes, phenekistoscopes, zootropes, praxinoscopes, kineographs, etc.

Most of these devices utilized a continuous sequence of hand-drawn pictures illustrating some simple mode of movement, such as a man jumping, a windmill turning, and the like. It is of interest to note that projection was actually attempted with some of them. And the kineograph is known today as a "movie book." It consists of a number of animated drawings or photographs bound together in chronological sequence, so that when the pages are rapidly flipped a fleeting motion picture scene appears.

Henry Heyl's First 'Movies'

The earliest attempts at motion picture photography merit a few words. The work of Henry Heyl is particularly worthy of mention because he was the first to project "moving" pictures. In February of 1870 he projected a series of *individually posed* photographs at the Academy of Music, Philadelphia, by means of a "magic lantern" called a phasmatrope (literally, "apparition mover") arranged

to project the separately made slides in rapid succession.

The work of Edward Muggeridge (or Eadweard Muybridge) is also important. His "instantaneous" photographs of a galloping horse are a milestone in motion picture history, not only because various stages of *natural* motion were photographed for the first time, but also because Muybridge made a serious attempt to project his plates in rapid succession to reproduce the natural motion on a screen. This was in 1881. He named his device a zoopraxiscope ("animal action viewer").

Muybridge and Co-Workers

While Muybridge in America tackled the problem of analyzing the movements of animals and birds, Anschütz in Germany and Marey in France were doing work along the same lines. Moreover, Auguste Lumière, the French photographic manufacturer, brought out the first photographic "movie book" about this time, and Thomas Alva Edison in the United States was seriously considering the possibility of photographing motion scenes and reproducing them in a natural manner.

Motion picture historians usually stop at this point and draw a line across the page, as it were, to remind the reader that the story of commercially feasible motion pictures really begins with Edison. This pause is convenient, but actually artificial, for many inventors were

simultaneously and independently working on the same problem—a case of many minds with a single thought.

The Lumière brothers in France, for example, or Messter in Germany or Paul in England might have been the first to photograph and reproduce long motion picture *films* had it not been for the fact that the first long celluloid photographic films were introduced commercially and on a large scale, not in France, Germany, or England, but in the United States.

The Eastman Roll-Film

George Eastman, founder of Eastman Kodak Co. did not discover celluloid nor did he invent the gelatine-coated celluloid roll-film. Such films were known in Paris as early as 1887. Eastman made improvements in this type of sensitized material, and was the first to manufacture it on a large scale.

Eastman's roll-film, first marketed in 1889, consisted of a thin pellicle of celluloid coated with an emulsion of light-sensitive silver bromide suspended in gelatine—essentially the same as present-day photographic film. Now, Edison saw in this new film exactly what he needed to make long motion picture records.

Edison's camera, called the Kinetograph, was first used in 1889. The first films which he produced, however, were very unlike modern films. The individual picture "frames" were *circular* in shape and were arranged *horizontally* along the length of the film.

In 1891, however, Edison altered his Kinetograph so that *rectangular* frames placed *vertically* were impressed upon the film. The film was 35 mm (1.378 inches) in width and perforated with 64 oblong

sprocket holes per foot along each edge. There were 16 frames per linear foot, hence each frame was allotted 4 sprocket holes on each side.

It is clear from this description that the Edison film of 1891 forms the basis of our present-day standard film. The main difference—a difference which would make an original Edison print unusable on a modern projector—was the adoption of 46 frames per second as the normal rate of speed. The photographic aspect of Edison's films was orthodox. The film exposed in the Kinetograph was the negative from which any desired number of positives could be printed at any time.

Edison Not Projector Inventor

Although Edison invented the standard motion picture camera, he did not invent the projector. In a letter to the editor of *The New York Times*, dated June 8, 1921, Edison wrote:

"The main invention was the Kinetograph, which was an instrument for recording ('taking') motion pictures, as now used. It was not the apparatus for the reproduction of the pictures, enlarged, on the screen. It is on the projecting machine only that the claims of others can be based." But he goes on to say that he should be honored as the inventor of the modern motion picture because the projector "is the same as the recording instrument with several attachments to adapt it for screen purposes." Does Edison deserve this honor?

Edison's motion picture positives were used in the form of continuous loops in his motor-driven peephole "reproducers" which were called Kinetoscopes to distinguish them from the Kinetograph which photographed the pictures. The development of the projection art in America was all but nipped in the bud by the unfortunate fact that Edison had no interest in projecting pictures so long as he was able to capitalize on his peepshow concessions. In fact, he strenuously opposed the building of projectors, considering them an infringement of his lucrative peephole patents, and he threatened many times to bring suit against all who constructed or even used projection machines.

Early European Developments

One American projection pioneer challenged Edison by publishing a letter which ended: "If Mr. Edison can project pictures of moving objects on a screen, as he says he can, why does he not do so publicly as I have done, and do this at once?"¹

We must therefore look to Europe for the first significant developments in pro-

jection, including the inception of projection-film standards which were to prevail universally until sound pictures were introduced in 1928. *Nevertheless, Edison's 35-mm film with 16 frames to the foot is apparent in all but a few of these developments.*

The principles of optical projection were probably known in the Far East many thousands of years ago; but as far as we are concerned, the optical projector appeared in diverse forms in sixteenth-century Europe. The projection of "views" (slides) by means of the "magic lantern," or stereopticon, was a favorite parlor amusement in the Victorian era. It was only natural that Edison's motion picture inventions should spur many inventors beyond the range of Edison's continual threats of lawsuit to devise "cinematographs" for the projection of films.

Auguste and Louis Lumière of France examined a few of Edison's films and began at once to build cameras and produce films of their own. Moreover, the idea of a projector was uppermost in their minds at the outset. They completed their projector, called the Cinématographe, in 1894. Because this was the first film projector ever built, we credit the Lumières with the invention of the motion picture projector, just as we credit Edison with the invention of the motion picture camera.

The Lumières adopted Edison's film width (35 mm), but they perforated their films with only one circular sprocket hole per frame on each edge of the film. The most noteworthy departure from Edison's standards, however, was the adoption of 16 frames per second instead of 46 for the rate of film travel.

Lumières' Advanced Design

The Lumière Cinématographe utilized a claw intermittent movement and an arclamp with a water-cooled condenser. The arrangement of the whole apparatus was exactly the same as now prevails with modern theatre machines.

The camera made by the Lumière brothers was much more like the modern movie camera than was the bulky and practically stationary Edison Kinetograph. Small and portable, the Lumière camera could be carried anywhere to film topical events. And what is of

supreme importance, the photographic quality of the Lumière films was vastly superior to that of the Edison films.

Credit for the first exhibition of motion picture films projected for a large audience also goes to the Lumières, for on March 22, 1895 they exhibited a number of films before members of the Société pour l'encouragement à l'industrie in Paris.

But in the meantime Max Skladanowsky of Germany devised a motion picture camera, and also a unique type of projector, called the Bioskop. He produced a number of short films which could be used only in his "Doppelprojektor." Projectionists outside of Europe hear very little about Skladanowsky because his system was so radical and, according to today's standards, impractical.

Although Skladanowsky contributed nothing to the development of the motion picture art, he must be mentioned because, so far as we know, he was the very first person to give a public exhibition of movies for the purpose of entertainment. (The Lumières' first exhibition was given only as a demonstration for a group of French industrialists). Skladanowsky presented his "living photographs" for the first time on November 1, 1895, in the famed Wintergarten of Berlin.

Skladanowsky a Real Pioneer

Skladanowsky's camera was constructed to take 8 rather large "frames" per second on unperforated snapshot film. The individual frames were not perfectly registered, of course, so they were cut from the print (also snapshot film), placed in registration by visual judgment, bound together with metal edge bands, perforated by means of a metal punch, and the perforations fitted with metal shoe eyelets! This, in itself, is amazing enough; but what is even more astonishing is the double-projection system Skladanowsky used.

Each scene, or film-subject, was made into two separate continuous loops of metal-bound film, one band containing the alternate frames 1, 3, 5, 7, etc., and the other band the alternate frames 2, 4, 6, 8, etc. The two loops were shown with a special double-projector to give a

(Continued on page 29)



Muybridge photographs like these, produced by multiple cameras operated by strings attached to electric switches which controlled the shutters, proved that a horse lifts all feet off the ground at once in a gallop. These pictures are a milestone in motion picture history.

¹ From a letter written by Woodville Latham to *The New York Sun*, dated April 22, 1895.



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INCREASING evidence is at hand that the presentation of motion pictures in theaters will be subjected to what are now regarded as radical innovations. It is known, for example, that such advances as three-dimensional pictures, true stereophonic sound reproduction and vastly improved color processes have long languished in a practically completed state in the laboratory; and the lethargy displayed by the film production-distribution-exhibition forces in taking the wraps off such improvements in the face of declining box-office receipts is most difficult of understanding.

It is anticipated, however, that in the not too distant future the exhibition end of the industry will be galvanized into

below that of the screen. The intensity of the light was varied by means of a simple system: a fraction of the light passing through the projector gate was deflected upon a photocell, the output of which was read upon a meter.

"As the needle of the meter moved, a dimmer knob was shifted by the projectionist. It would not be difficult today to introduce a completely automatic relay system."

More Physiology Than Showmanship

Martin Harper's aim, observes Mr. Cricks, aim less a matter of showmanship than of physiology. He held that an illuminated screen surround caused the pupil of the eye to open, and so en-

the journal, is a matter of taste: for short scenes one's attention is fixed on the picture, and changes of color are hardly noticed; but a too-frequent change of color is a source of distraction.

The application of such a system to two British theaters is described by Mr. Cricks as follows:

When engineer W. J. Foy's circuit took over the Empire, Penge, an old legitimate theater, he was faced with the difficulty that although it was fairly large, sight lines prevented the screen being larger than 16 by 12 feet. He argued that he could increase the apparent size of the screen by an illuminated surround.

He obtained a special plastic screen which was strained round the frame without any masking and without the fixing ropes showing. The frame was mounted in the center of the stage, with the normal speaker system behind it. Around it was arranged a semi-circle of drapes, lit in several colors from the stage battens, which enabled a wide range of color.

The projector apertures were carefully filed out so that the picture exactly fitted the screen, with only an unnoticeable margin to prevent it spilling over the edge. The effect is that the picture is either silhouetted upon the colored surround, or merges into it, according to whether the color of the picture and the background contrast or match.

The lighting is used at full brilliance during titles, and dimmed down during a color film; it is switched off altogether for black-and-white films. The colors are not changed during the performance. I found the appearance very attractive. My only criticism was that the screen stands upon the stage.

At the Majestic, Portsmouth, Mr. Foy has an improved system in hand. He is strongly of the opinion that the surround should not be a flat surface, but should be draped. At Portsmouth he proposes surrounding the screen on all four edges by drapes, which will be illuminated in the same way as at Penge—which means to say that light of different colors can be used.

Representing the American viewpoint, Ben Schlanger holds that the original conception of a non-masked screen wherein consideration was given only to the physical means of seeing has long since been supplanted by the psycho-physical theory which gives precedence to the psychological effect of a vignettted screen image upon the viewer.

Screen Light Level Controlling

Mr. Schlanger holds that only the low screen light level prevailing many years ago justified the use of a black screen masking. The comparatively high screen light level of today, he avers, has eliminated the need for screen masking, quite apart from any consideration of the greatly heightened dramatic impact upon the viewer which could be realized by the elimination of masking.

The original Schlanger proposal was that the light passing through the edges of an unmasked screen should be so utilized that it would vignette off on all sides of the picture area and illuminate an

Renewed Interest in The Maskless Screen

action on the score of improved presentation technique by sheer economic pressure as represented by sharply sagging receipts.

One means of effecting improved projection technique is presently engaging the earnest attention of motion picture technicians not only in the United States but also in England. Reference is made here to the elimination of the traditional black masking which effects a sharp cut-off of the projected light and lets the light splay off vignette-fashion on all sides of the screen.

Illuminated Screen Surround

The illuminated screen surround is not, of course, a new idea, but it has never been able to win general acceptance in the exhibition field. Numerous attempts to popularize this technique have been made down through the years, notably by Ben Schlanger, prominent American theater architect, of whom more anon herein. Let us consider first recent developments in this connection as reported from England.

In a recent issue of *Ideal Kinema* (London) R. Howard Cricks, technical editor, reports on recent experiments with illuminated screen borders (no masking) in British theaters. Mr. Cricks introduces his report by describing the first such demonstration he witnessed, the development of the noted inventor, Martin Harper. Recounts Mr. Cricks:

"A trough was arranged around the screen, concealing low-powered lamps which gave the effect of 'grey light'—in other words, an intensity considerably

hanced the contrast of the picture by deepening the blacks; the system also reduced eyestrain—a contention subsequently approved by a report of a committee of the Illuminating Engineering Society which considered auditorium lighting.

At the SMPE autumn, 1947, convention in New York, R. Gillespie Williams (noted British engineer) advocated that the screen should be silhouetted against a border of complementary color to that of the picture.* The continual change of color was effected by a color control system whereby movement of a single pointer over a scale produced an infinitely large number of colors throughout the spectrum.

A rather similar system is operating at the Fontainebleu Kinema, Paris, France, wherein the projection screen is placed a small distance in front of another screen which is lit by colored lamps. The color and the intensity of the light are controlled by the projectionist, and according to his taste the color may correspond with the dominant hue of picture, or it may be a complementary color in order to heighten contrast.

Two Recent British Ventures

Mr. Cricks reports the French journal *La Technique Cinématographique* as having suggested that the continual variation of color imposes a certain strain upon the projectionist, thus making desirable a system of automatic control. The desirability of the system, continues

* "Dynamic Luminous Color for Film Presentation"; J. Soc. Mot. Pict. Eng., April, 1948.

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appropriate surround. This method was held to be applicable with equally good results to both black-and-white and color films.

A logical extension of this idea, and a more ambitious undertaking which would require the cooperation of the studios in the taking of the pictures, was advanced by Mr. Schlanger in a detailed presentation to the autumn, 1947, meeting of the SMPE.* Here are excerpts from this presentation:

Enlarged Screen, Image Location

Figure 1 is a view looking at the proposed screen. The area enclosed by Line 1 represents the average present screen size; while Line 2 shows the proposed enlarged screen area. The bean-shaped form enclosed by the dotted line indicating area A will be referred to as the "distinct visual field"; while the area remaining between Line 2 boundary and the bean shape will be referred to as the "peripheral vignette."

Area C outside of boundary Line 2 is the surface outside of the screen area. The bean-shaped area A is intended as a momentary shape only: this shape may change in form and size in accordance with dramatic requirements.

Assume first that instead of projecting a picture of approximately 18 feet wide from a 35-mm film, a picture approximately 5 feet wider and of a height consistent with present standard proportions is projected. Right here there seems to be a handicap presented by the difficulty of enlarging the screen area because of proscenium-size limitations and balcony overhang cutoffs in existing theaters.

The answer to this is that wherever these difficulties can be overcome economically with a change in structure, the effect proposed would be most desirable; but where such difficulties cannot be so avoided, the effect still will be better than the present one, because any portion of the enlarged screen that would be cut off from view because of an overhanging balcony would not create any serious loss of picture area. Loss of view of some portion of the peripheral vignette would not prove serious.

Requisites on Production End

Now, what happens in Hollywood? Generally, the picture would be taken on film as it is now. But the director and the cameraman would become aware of a new freedom in picture composition and in creating dramatic impact. Their focal point of action could be concentrated at center, left, right—and at the corners—or any part of the screen.

The physical area of clearly-defined picture area, which would be the "pear shape" shown or any other desirable shape, will always be large enough to tell its story but need not and should not necessarily fill the entire screen area. When the director chooses to use the entire screen he will be doing so for special emphasis only.

What happens with the rest of the screen area that is not being used for clearly-de-

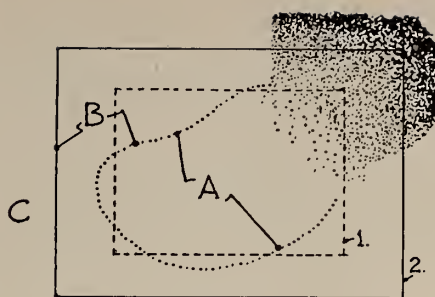


FIGURE 1

fined images is very important, and it is here that the peripheral-vignette idea comes into play.

The vignette recommended here is one that diminishes the light value toward the edges of the picture. Light and color values seem to dim out in the visual peripheral. Colors do not change in hue, rather do they seem to become grayer. The reduced light value proposed for the vignette is also the means for creating a transitional light intensity between the bright picture and the picture environment.

This development at last gives something that will make it possible to eliminate the false black masking now used around the motion picture.

Any lingering doubts as to Mr.

Schlanger's sincerity of purpose no less than a profound belief in his own proposal was dispelled more than two years ago when he designed two theaters to serve as pilots for the future development of maskless motion picture screens.

For more than a year now these two theaters, situated in desirable residential sections of Connecticut, have been utilizing maskless screens which employ the peripheral-vignette idea—and to date there has not been a single unfavorable comment thereon from the audience, or the management, or the projectionists. In fact, all concerned seem to be wholly unaware of this innovation in motion picture projection, which is probably the best endorsement that might be had therefor.

Significant developments in connection with the spread of this maskless screen are even now in the making—developments which IP is not at liberty to divulge at the moment. It is hoped, however, that in the interim projectionists will give this idea serious thought and that they will not hesitate to forward to IP any interesting conclusions that they may reach in connection with this novel technique.

New 'National' Hitex Super-High Carbon Now Available

National Carbon Co. made available during March its new and greatly improved 13.6-mm x 22" super high-intensity positive carbon designed for normal operation within the range of 170-180 amperes. This new carbon is marketed under the name "Hitex."

The "Hitex" carbon, compared with the previous super-high intensity carbon, gives as much as 50% longer life at the same current. At a higher current it gives as much as 15% more light without any measurable increase in heat at

the aperture, thus the higher light level is attained without in any way aggravating the problems of heat on the film. In addition, the light is noticeably "whiter." It burns with 30 to 50% greater efficiency in terms of light produced for a given length of carbon consumed.

This new carbon was described in detail in IP several months ago,* including the accompany table of operating characteristics.

*"The new 13.6-mm National Hitex Super High-Intensity Carbon"; IP for December, 1949, p. 14.

TABLE A. Characteristics of 13.6-mm old and new National super high-intensity projector carbons under typical operating conditions.

	Old Super	New 'Hitex' Super	
Arc Amperes	170	170	180
Arc Volts	75	70	74
Positive Consumption Rate (inches per hour)	24.0	16.0	21.5
Screen Lumens at Maximum Light*	21,500	20,700	24,800
Side-to-Center Screen Distribution Ratio at Maximum Light	65	60	60
Screen Lumens at 80% Screen Distribution**	18,500	17,500	19,300

* Screen lumens with no projector shutter, film or filters; condensers at F:2.0 adjusted for maximum light.

** Same, except that condensers are adjusted for 80% side-to-center screen light distribution ratio.

* "Increasing the Effectiveness of Motion Picture Presentation"; J. Soc. of M. P. Eng., April, 1948.

The Geneva Intermittent Movement

11

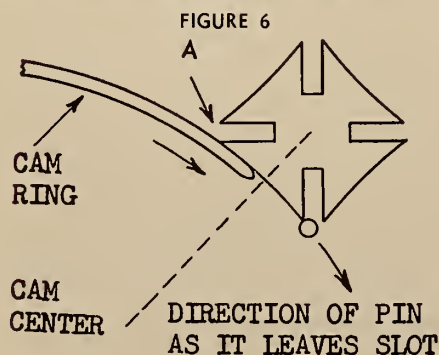
IN THE extremely fast movement no bounce occurs when the pin leaves the slot, but a tendency to bounce exists when the curved surface of the star contacts the lock ring, which may be quite serious. The pin will not completely stop the star, due to the same conditions which started the star so violently, shown in Figs. 4 and 5 in the last issue of IP (March, p. 8).

Since the pin leaves the star before the star has stopped, the latter must be stopped some other way. Unless the film tension is abnormal, the point of the star strikes the cam ring at *A*, Fig. 6, and rebounds, causing the star and sprocket to turn backwards. This is more serious here, because no film tension alleviates the trouble.

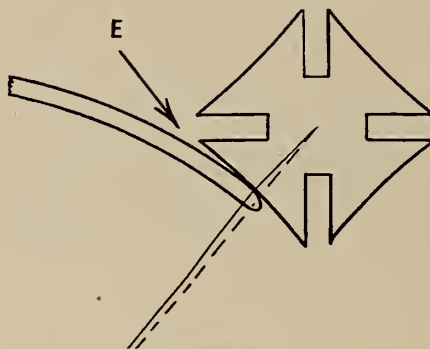
While the star is turning clockwise, due to the rebound, the cam is also turning clockwise, so the second contact occurs when the end of the cam ring is somewhere between the position shown in Fig. 6 and the dotted line. The end of the cam ring and the star are moving in opposite directions, resulting in a collision, and due to the position of the parts, a terrific wedging action takes place, tending to force the star and cam apart and also to bend the two shafts, causing high pressures between the journals and their bearings.

Figure 7 shows the parts at the second impact. The dotted line connects the shaft centers; solid lines are drawn from the star center to the point of impact, and from there to the cam center. The solid lines bend only slightly at the point of impact, being nearly in a straight line and causing extremely high pressures for an instant. A small opening exists at *E*, showing that the star has bounced and must again turn in the normal direction (counter-clockwise) to close this gap.

When this gap has again closed, the end of the cam ring has moved past the dotted line, and the star is locked in



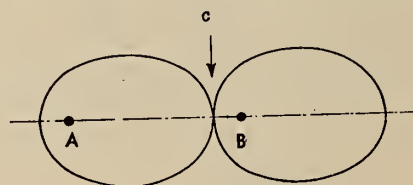
position. Such a movement undergoes a severe beating, and failure is only a matter of time. Of course, this treatment does the film no good: a few times



through the machine causes checked sprocket holes, and complete failure soon follows.

Effecting Faster Film Transfer

A faster film transfer may be accomplished in other ways. Although results are similar, the parts and the film last longer. In effect, it is as though the projector speeds up—say, to 180 feet per minute—while the film is pulled down. The projector then slows down below 90 feet per minute and runs at this speed until the next film transfer. Actually,



the machine runs at 90 feet, but the cam is accelerated when about to move the star, and again decelerated at the completion of the star movement.

The star and cam are to designed that a three-to-one movement results. The cam is driven by a pair of *elliptical* gears having a one-to-one ratio. The shaft is located at one of the foci of the driving gear, making the gear appear to wobble as it revolves.

Angular Velocity Ratio of Gears

In Fig. 8, *A* is the shaft center of the driving gear, and *B* is the shaft center of the driven gear, to which the cam is fastened. Shaft *A* has a comparatively heavy flywheel, to maintain a constant angular velocity of the driving gear. The driven gear varies greatly in its angular velocity, and the cam is so arranged that it moves the star when the velocity of the driven gear is greatest.

By A. C. SCHROEDER

The angular velocity *ratio* of the two gears varies according to the respective radii of the gears at the point of contact. (The gear teeth are not shown; the gears are shown as two blanks, or friction gears, that would roll on each other as the toothed gears do.) The radius of the driving gear at *this instant* is the distance *A* to *C*, and *BC* is the radius of the driven gear.

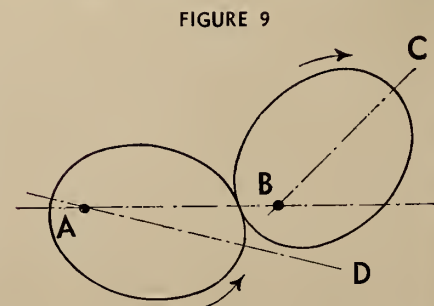
The ratio is about five-to-one. In other words, *B* is turning about five times as fast as *A*, and consequently the cam is also turning at this speed. At this instant the star and cam are in the position shown in Fig. 2 (IP for March); the star has turned through a 45-degree angle and is turning at its greatest speed, and simultaneously the cam is turning at its greatest speed, thus producing an extremely fast movement.

The angular velocity ratio of the two gears is constantly changing: for each fraction of a degree that gear *A* turns, gear *B* turns a different amount, except at two positions of *A* where both gears have the same angular velocity. This holds true, however, for only an instant. The speed of *B* has been increasing up to the moment shown in Fig. 8. From here on *B* slows down and continues to do so until both gears have turned one-half revolution. Then *B* accelerates again, until the position of Fig. 8 is reached once more.

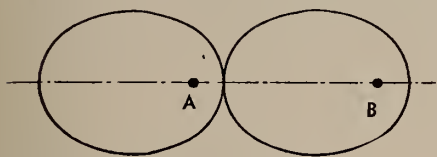
In Fig. 10 both gears have turned one-half revolution from the position of Fig. 8. *B* now turns about one-fifth as fast as *A*, thus allowing a long time before the cam pin enters the star again.

Figure 9 shows the gears at the instant the cam pin enters the star, which is 45 degrees before the position shown in Fig. 8. The line *BC* is drawn through the foci of the driven gear, being 45 degrees from the horizontal line. Line *AD* is drawn through the foci of the driving gear, being approximately 12 degrees from the horizontal line.

In Fig. 8 the foci of both gears coin-



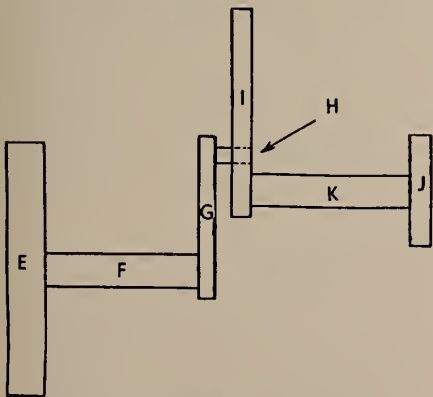
After the gears pass the position of Fig. 8, the action is similar, but in re-



verse order. Consequently B turns 45 degrees past the position of Fig. 8, while A turns 12 degrees beyond this position, and the cam pin is now leaving the star. The total movement of B was 90 degrees, while A turned only 24 degrees, during which time the film was pulled down.

The shutter turns at the same speed as gear A , and for each revolution of A one frame of film is pulled down. A acts just as the flywheel and the camshaft in our conventional machine, so we must calculate the speed of the movement from A . Since the film is moving only while the flywheel turns 24 degrees, it remains stationary for 336 degrees of flywheel travel. 336 being 14 times 24, we have a 14-to-1 movement which is *some* speed and requires a shutter with about a 24-degree blade. Our regular shutter blade is about 90 degrees.

Elliptical gears are costly and hard to cut without special equipment. Edison, on his last machine, used a system



of levers to obtain similar results. Fig. 11 shows a layout which produces a varying angular velocity of the driven shaft. E is the flywheel, fastened to shaft F , on the other end of which is the lever G . In the upper end of G is

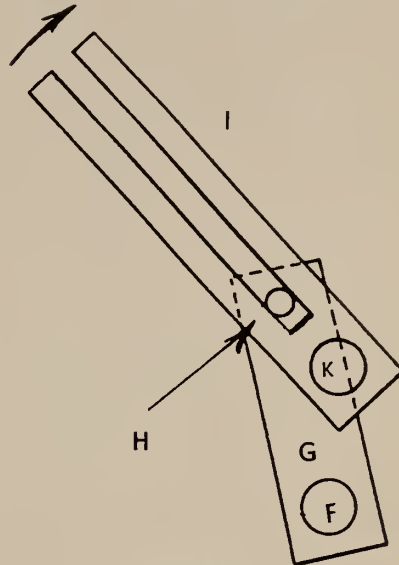
The dotted lines show portions of lever G which are hidden by the forked member I . Pin H is the only means of transmitting motion from G to I . H is continually sliding in the slot in I .

In Fig. 13 the levers have almost reached the vertical position again, but in the downward direction. The pin is nearly at the end of the slot, and K is turning relatively slowly. When the levers point straight down, K is moving at the slowest speed, and from here on it again accelerates.

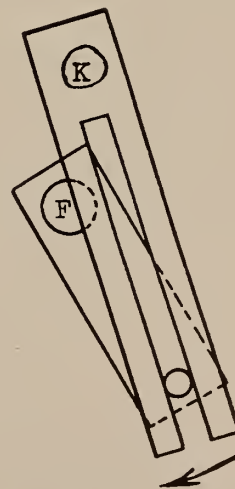
Here the 90 degrees of cam rotation is obtained by only 32 degrees of flywheel travel. Thus we have 328 degrees of flywheel travel in which the film remains stationary, allowing more time for projection to the screen, deducting that lost due to the flicker blade on the shutter, of course, as we also do in conventional projectors.

If camshaft K is displaced only slightly from the in-line position, the pin moves slightly within the forked member and the speed of I begins to vary, increasing as the levers move in an upward direction, decreasing as they move in the downward direction. The amount of speed variation depends on how far the shafts are out of line, and

This is what Edison did. Obviously, the cam and camshaft cannot be moved very easily. (These parts actually move



Edison used two more levers, as in Fig. 14. Both driving levers are marked *G*, both pins are indicated by *H*, and the forked levers are *I*. Notice the third *L*, which is moveable in an up-and-down direction, indicated by the double-pointed arrow. When *L*, together with the two levers fastened to it, *I* and *G*, is moved downward so that it is in line with *F* and *K*, the drive is straight through, just as though *F* and *K* were



As shown in Fig. 14, pin H in the first lever is very close to shaft L , causing a large variation in the speed of L , the latter being shown at the position

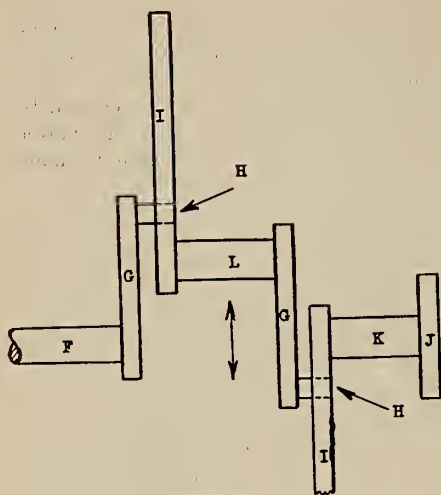


FIGURE 14

where its speed is greatest. At the opposite end of *L* the lever *G* points straight down, and *its* pin is close to shaft *K*, and *K* turns at its greatest speed. The condition is such that the speed variation is multiplied: not only has the speed of *L* been greatly increased, but at the same time *L*, through means of *its* lever *G*, increases the speed of *K* and, consequently, the speed of cam *J*.

Double-Lever Arrangement Effect

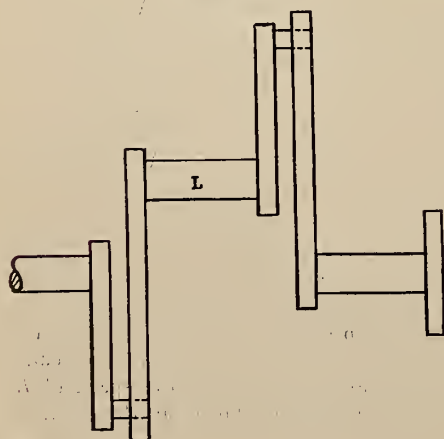
In Fig. 15 the parts have turned one-half revolution from the position in Fig. 14. The first two levers have greatly slowed down shaft *L*, which in turn has slowed down the camshaft by means of the second pair of levers.

By the use of this double system of levers the effective speed of the movement can be changed without moving the camshaft; only the shaft *L* and its connected levers are moved up or down. This causes no complications, because the only connection to *L* is through the two pins *H*, which are free to move in their respective slots.

Slight Speed Increase Possible

The actual displacement of *L* from the in-line position was only a small amount. A larger displacement causes so great an increase in the speed of the move-

FIGURE 15



ment that the film simply cannot stand the terrific strain. This strain is not due to the conditions set forth in Figs. 3, 4, and 5 last month, because our present cam and star is actually a 3-to-1 movement and operates as shown in Figs. 1 and 2.

But even such a movement will, if the projector speed be increased enough, strain and eventually tear the sprocket holes. This is what happens when the movement is accelerated by a system of levers or through the use of elliptical gearing. Only a slight increase in speed is therefore permissible, and each increase calls for greater film tension to assure the film stopping in the proper position. Of course, the increased tension produces more strain on the film during the period in which it is started and accelerated.

[TO BE CONTINUED]

Latest Film-Flam Philology

Bringing discussions on the use of the word "flammable" up to date, the National Fire Protection Association announces that many organizations have adopted "flammable" to designate materials that are easily ignited and burn with unusual rapidity. In law, however, the NFPA points out, the word "inflammable" persists.

"Now, after 25 years, the Congress of the United States has given official sanction to 'flammable,'" the NFPA reports in its *Fire News*. "It has just come to our attention," the *News* declares, "that in Chapter 39 of Public Law 772 the word 'flammable' is used in place of 'inflammable' with reference to Interstate Commerce Commission regulatory powers. The Civil Aeronautics Board adopted the word 'flammable' in their Revised Regulations.

Projectionist Examination Questions

21. A unit of length used in electricity and which is equal to 1/1000 of an inch is called.....

22. Films may be rewound in the projection room proper provided that.....

23. You have discovered that you are burning "upside down." To correct this trouble you would change the electrical connections at.....

24. When your equipment, which operates on a 3-wire system, takes 55 amperes from one side of the system and 45 amperes from the other side, the current which flows in the neutral wire under these conditions will be.....

25. If your equipment takes 55 amperes at 120 volts, you would be using.....kilowatts.

26. The resistance of a copper wire one mil in diameter and one foot long at normal room temperature is known as.....

27. That wire of a 3-wire d-c system which is "positive" to one wire and "negative" to the remaining wire is called the.....

28. That property of a conductor which opposes the flow of current is called.....

29. The amplifier that amplifies the currents set up in the photoelectric cell is called.....

30. R.p.m. is the abbreviation for.....

31. The space on the film upon which the sound is photographically impressed is called.....

32. The smallest size wire which may be used to supply a professional projector shall be.....

33. A motor-generator installed in the projector enclosure shall have the commutator end protected by, or by other suitable means.

34. The ventilation of the projection room shall be provided by means of a vent pipe having a cross-sectional area of at least.....

35. After striking the arc and permitting it to burn for a few minutes, you open the table switch. If the carbons glow with the same brilliancy, the current supplying the arc is.....

36. The metal out of which lamp-houses are to be built shall not be smaller than sheet metal gauge.

37. A projector carbon having no core is called.....

38. The insulating material between the plates of a condenser is called the.....

39. The doors of magazines shall be designed to swing.....

40. If you connect a rheostat rated at 40 amperes and 120 volts in multiple with a rheostat rated at 80 amperes and 240 volts, the total resistance will be.....ohms.

Heating of Film by High-Intensity Arcs

By HUGH McG. ROSS

SUPPLEMENTING THE DATA ON MEANS FOR REDUCING THE HEAT PRODUCED BY HIGH-INTENSITY ARCS THAT HAS APPEARED IN THESE PAGES ARE THE APPENDED EXCERPTS FROM A PAPER PRESENTED RECENTLY BEFORE THE BRITISH KINEMATOGRAPH SOCIETY AND PUBLISHED IN THE JOURNAL OF THE SOCIETY.

IN ORDER to reduce the heating effect of a high-intensity arc on film, it is clearly desirable to remove the infra-red radiation and, perhaps, also the ultra-violet radiation. Water, even in a very thin layer, is virtually opaque to radiation above 2.35 microns (1 micron-1 one-thousandth of a mm.). This is of particular value in keeping cool the lenses and other parts of the optical system, because crown glass begins to absorb quite heavily at longer wave-lengths than this.

Perhaps the most convenient infra-red filter is provided by type ON20 heat-absorbing glass made by Chance Bros. This is almost colorless and it absorbs well in the near infra-red. Its transmission increases slightly as the wave-length increases and only becomes negligible above 3.4 microns. For many applications this type of filter is suitable, and the heat which it absorbs may be dissipated by natural convection to the air, or the glass may be cooled by blowing air on it.

Combined Heat-Absorbing Cell, Lens

It is probable, however, that the most suitable infra-red filter for practical use in high-power projectors is a combination of a thin layer of water with a sheet of ON20 glass. This absorbs well in the near infra-red, provides full protection to the lenses, and is reliable and stable in use.

Figure 1 shows diagrammatically such a filter combined with the first condenser lens of a process projector. The arc runs at 300 amps, with a 16-mm positive carbon, and $2\frac{3}{4}$ inches away from this is the front window of the cell $5\frac{1}{4}$ inches diameter. This window is made of quartz in order that it may readily withstand the heat of the arc and its flame.

On the other side of the quartz there is a narrow water channel, the water being constantly circulated by a pump and motor. The efficiency of cooling the quartz, and the whole front metal plate

of the cell facing the arc, is so good that after running the arc at 300 amps for 30 minutes it is possible to switch off, open the arc door and immediately hold one's hand against the quartz. A further consequence is that the cool quartz window is relatively little damaged by spatter from the arc, and being quite easily replaced, it acts instead of a spatter glass.

Second Dual-Purpose Channel

The light, after passing through the quartz and first water channel, passes through a sheet of ON20 glass and into a second water channel. The water channels serve the double purpose of cooling the ON20 glass and also contribute to the filtering of the light. In particular, the first water channel absorbs much of the infra-red radiation, thereby reducing the amount which the ON20 glass has to absorb.

If only a heat-absorbing cell were required, the farther window could be made of optical glass. But in this present example the light next passes into the first condenser lens of the optical system. Because the filter has removed the radiation of wave-lengths which might be absorbed by the glass, the lens does not get unduly hot, therefore it is made of crown glass for best optical performance. Similarly, the other lenses of the system are not heated seriously.

Only about 3 pints of distilled water

circulate around the cell, and of course the heat which passes into the water has to be continuously removed. At each end of the cell are cylindrical tanks which ensure that the stream of water is evenly distributed across the aperture, and in one of those there is a coil of copper tube. Cold tap-water passes through this (and is used also to cool the water-cooled jaws of the arc) and the heat from the circulating water is transferred to the tap-water which runs to waste. Of course, none of the tap-water gets into the cell.

Efficiency of Heat-Absorbing Cell

The total amount of heat taken up by this cell is 3600 watts. About one-third of this is unwanted radiation removed from the light beam, and the remainder is radiated on to the metalwork of the cell which is in the hot lamphouse.

It is estimated that such a cell and lens absorbs only 10% more of the visible light, compared with an ordinary lens. This is, in effect, recovered by avoiding the use of a separate spatter glass.

It may be added that the measured absorption of visible light from an arc by a simple cell comprising two glass windows and two inches of water is about 15%. The addition of 2-mm thickness of ON20 glass to such a cell absorbs only a further 6% of visible light from an arc, due to low reflection losses. An ON20 glass filter in air absorbs about 12% of the visible light from a tungsten bulb.

Luminous Efficiency of Radiation

When a beam of radiation is absorbed in any way, the energy of the radiation is converted into heat. Unless there is sufficient cooling, the temperature of the object absorbing the radiation will therefore rise. Contrary to what is often implied, it makes no difference to the heating effect whether this radiation is in the infra-red, the visible, or the ultra-violet regions of the spectrum.

One way of looking at this is to realize that just because the human eye can see radiation of certain wave-lengths, this is no reason for these wave-lengths to lose their heating effect. Consequently, in

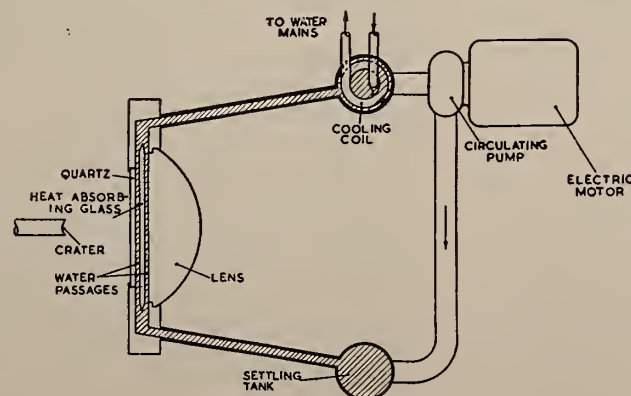


FIG. 1. Combined heat-absorbing filter and condenser lens for a projector. Note set up of electric motor, circulating pump and coil for the water-cooling.

any projector, wherever light is absorbed, heat is generated. All that can be done by filtering the light is to remove the unwanted radiation—those wavelengths which contribute to the heating effect without adding to the visible light—but we can never be rid of *all* the heat.

It is clearly desirable to reduce as much as possible the temperature of the metal parts of the gate, the pressure pad and film guides. This particularly helps to prevent emulsion pickup. Spill-light and light round the edges of the aperture fall on these parts all the time, and heat is generated.

It is largely the designer's concern, but much can be done by maintaining a good polish to metal surfaces so that most of the light and heat is reflected instead of being absorbed. However, some means must be provided for taking away the heat which passes into any metal part, by water-cooling or air-cooling (natural or blown) or, what is probably best where it is practical, by conducting of the heat from these small metal parts into the massive metalwork of the body of the projector.

Where, on the other hand, some metal part such as a pressure pad absorbs heat and yet cannot be rigidly mounted on the main metalwork, it must be cooled in some manner to keep down its temperature. Placing the shutter between the light source and these metal parts will halve the heating effect, but cannot do more.

Measurements of Temperature

If attempts are made to measure the temperatures of such parts, it is extremely important that the measuring device be kept out of the light-beam, or it will be heated up and a false reading obtained. It should also absorb only a small quantity of heat, particularly if the part being measured is made of material with low thermal conductivity, such as fibre, plastic or glass.

It is essential that good contact be maintained between the part and the measuring device. A method which could sometimes be used is to embed a thermo-couple in the part. An alternative is to run the projector for some minutes and then to turn off the light and measure very quickly the temperature of the part by means of special waxes of graded softening temperatures, or by the sense of touch. Such methods, although not particularly accurate, can reveal a great amount of information if carefully used.

Any attempt to measure the "gate temperature" directly by holding an in-

NOTE: The water-cooling method described in the accompanying article was intended for and applied to process projection rather than theater projection. This fact, however, in no manner alters the basic requisites for a solution of this problem.

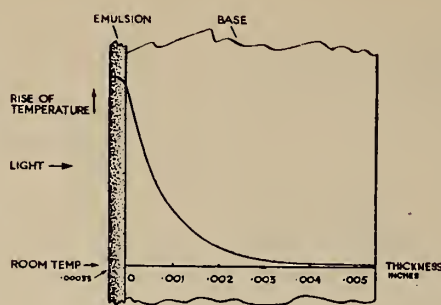


FIG. 2. Enlarged cross-sectional view of film, with graph showing distribution of temperature within the emulsion and base at end of exposure period in the gate. Only 1/1000 in. of the thickness of the base is heated significantly.

strument in the gate aperture is bound to fail, because the temperature reached depends primarily on the extent to which the instrument absorbs the radiation, and on the rate of losing heat from it by conducting or cooling. At best this method can only give a comparison between projectors.

Secondly, and by far the more important, the film is heated in the gate by the absorption of light and heat in the silver of the emulsion, or by dyes in the case of color film.

In the darker parts of an ordinary print, almost all of the light and heat is absorbed by the silver particles, which are distributed all through the thickness of the emulsion layer, being slightly more concentrated near the outer surface of the layer, as shown in the greatly enlarged cross-sectional view of the film, Fig. 2. Consequently the temperature throughout the emulsion layer rises rapidly.

It may be calculated that only a negligible part of the heat escapes from the emulsion to the air while the frame is in the gate, and consequently the heat flows through the emulsion layer and into the film base. Emulsion is a poor conductor of heat, and film base is even worse, which means in practice that the heat does not have time, during the brief exposure period, to travel far through the base.

Mode of Heat Absorption

The temperatures throughout the thickness of the film at the end of the exposure period are as sketched in Fig. 2. The following points may be noted:

(1) There is a small drop in temperature through the emulsion layer.

(2) The temperature of the emulsion is much higher than the average temperature of the base. This causes a curl or buckling of the film in the gate, as in a bi-metallic strip of a thermostat, the emulsion side curling outwards. This explains the effect photographed with an ultra-high-speed camera, where it was found that the buckling occurs very shortly after the beginning of the expos-

ure, and increases only slightly thereafter; the objective lens has therefore to be focused back slightly towards the arc to give the best average focus.

(3) The heat travels only a very short distance into the base during the exposing period and only about 1/1000 inch of the base is heated significantly.

(4) The rise of temperature of the far surface of the base during the exposing period is less than 1/100 that of the emulsion side of the base.

[To be Continued]

Kodak to Supply Du Pont With New Safety Film Base

Eastman Kodak Co. will sell some of its new safety base film (high acetyl) to Du Pont, it has been announced by Edward P. Curtis, Kodak vice-president in charge of all motion picture film sales. Pointing out that Kodak had worked for years to produce its present commercially successful 35-mm safety film, introduced to the trade in 1948, Curtis said:

"For a long time our scientists worked to produce a safety base for professional motion picture films. The base we have finally developed is known as 'triacetate,' commercial tests of which have indicated that it meets the strict standards of professional studio and theater use.

"The motion picture industry has welcomed this new base. It means greater safety for all who take, store or exhibit professional motion pictures, and, of course, for the theater-going public.

Speedy 100% Conversion Desired

"To make sure the . . . industry will have an adequate supply of the safety film it desires, we will furnish Du Pont with some of our safety base. We are selling to Du Pont temporarily (until Du Pont has developed its own new type of safety film) because we believe the sale will benefit the public interest by helping to speed up the . . . conversion . . . to universal use of safety film."

IP reported last month (March, p. 14) that Eastman had set Jan. 1 next as the effective date for 100% conversion to acetate film by all film studios. Nitrate projection prints are expected to continue in circulation for at least two years more.

Six New RCA Specialized Screens

Six new specialized screens to supplement the standard line of Snowwhite and Snowwhite Vinyl plastic screens have been announced by RCA's Theater Equipment Section. The new line affords a selection of screens for every purpose, with specialized applications with regard to theater size, lighting and type of equipment used. RCA supply dealers will advise as to the proper screen for each location.



TELECASTS

SMPTE Issues Policy Statement on Theater, Home Tv

Various interpretations by the trade, technical and lay press of the position of the Society of Motion Picture and Television Engineers with respect to the development of television, in both the theater and home fields, prompted the issuance by the SMPTE of the following statement of Society policy anent this development.

AS representative in technical matters for the motion picture industry, the SMPTE has developed its viewpoints and policies on the functions of television (Tv) in the . . . industry over the years. Further, it has evolved its viewpoints concerning the appropriate position of motion pictures in the Tv field.

The SMPTE has a fundamental judgment that motion pictures and sound-on-film represent the most highly perfected, effective, error-proof, and appealing medium for the recording, distribution and reproduction of dramatic and entertainment material. . . . (and) that sound film programs should be adequately utilized in all cases where the public can be effectively entertained or instructed by them.

Theater Tv Distribution Means

The SMPTE is particularly interested in two phases of the Tv art. One of these is theater Tv. . . . The other is the utilization of films produced within the motion picture industry for Tv transmission or broadcasts to the general public, whether over networks or individual stations.

In relation to theater Tv . . . (such) programs may be distributed from their point of origin to the individual theaters, perhaps in many cities over coaxial cable, radio-relay systems, or perhaps later and as yet untested methods.

The SMPTE takes no stand as to selection of the distribution channel. It does, however, strongly urge that whatever facilities within the grant of a government regulatory body shall be required for theater Tv shall be made fully available. . . . distribution channels or facilities should be granted to those distributing theater Tv programs in such fashion that they can effectively and on a basis of equal opportunity compete with Tv broadcasting into the home or any other medium for the distribution of entertainment or educational programs. . . .

Cites Probable Decisive Factors

Programs may be distributed by individual theatres, by groups of theatres, by

film distributors, by Tv program distributors, or others. Further, such programs may be distributed within a given city, or throughout a group of cities. Distribution may be carried out by either a private organization representative of one of those mentioned previously, or it may be carried out by a common carrier or public utility normally engaged in the distribution of messages or program material.

The SMPTE takes no stand and urges no preference between private or common carrier groups in the handling of Tv programs, distribution to theatres or groups of theatres. Considerations of economics, quality, convenience, and availability of service will doubtless be the criteria which will lead the motion picture industry to select an appropriate agency for the distribution of theatre Tv programs. . . .

Medium For Home Tv Program

The SMPTE does not propose, nor necessarily approve, the use of film by broadcasting networks or individual stations for Tv transmission into the home. However, the SMPTE . . . points out that certain methods of program recording, both video and audio, have been developed which may find economic and adequate use in the motion picture industry. Such methods of film photography may come up with further technical and artistic development, enabling the economic production on film of acceptable program material of a character making its use attractive to the Tv broadcasters and pro-

Incidental Intelligence

Tv's growth economically is directly tied-in with the number of Tv receiving sets in operation. Set sales are given a tremendous impetus by the quality of program fare offered. Good program fare can be had only by a large increase in the number of program sponsors. Today there are 2000 video advertisers as against 500 a year ago. Well?

gram sponsors and profitable to the motion picture industry.

Accordingly, the SMPTE does suggest that careful study be devoted to various methods of producing programs on film of adequate technical and entertainment or educational quality. It suggests further that it might be appropriate, when data on such production methods become fully available, to consider how best the motion picture industry may secure the acceptance of the home Tv audience for film productions as such.

Co-ordinated Film Production

It proposes further that the motion picture industry shall study the coordination of its theatre film production and Tv film production activities so that, with suitable differentiation of program character and general quality, it may adequately serve both the home and the theatre and derive full profit from each group.

Further, the SMPTE urges that, throughout such a study by the motion picture industry, particular stress shall be laid upon the permanent perpetuation of the position of the motion picture theatre through the development of types of programs and methods of presentation peculiar to the theatre and capable of maintaining the favorable position of the theatre as a major entertainment agency.

* * *

Phonevision Exec Sees Finis for 'Marginal' Theaters

Phonevision would write "finis" to the careers of about half of the now existing motion picture theaters, H. C. Bonfig, Zenith Radio vice-president, declared recently. Phonevision is the quarter-in-the-slot Tv program sent via the regular home telephone wire.

Holding that Tv has already made serious inroads in the box-office returns of theaters in Tv areas, Bonfig stated that about 1000 theaters were forced to shutter last year, and that there are about 9000 "marginal" theaters in the industry today. These, he said, would be closed by Phonevision.

Dim Outlook for Theaters

Tv offers a tremendous problem, he said, and the motion picture industry will have to adopt Phonevision to save its production setup, despite the difficulty in turning its back on old custom.
(Continued on page 27)

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

WIDESPREAD interest in some form of security benefits has prompted IP to enlist the aid of the AF of L, the CIO, and the U. S. Department of Labor in calculating the extent of such plans in terms of total manpower covered in what amount, whether the entire cost is paid by the employer, and whether the total monthly payment is affected—that is, reduced—by the amount of Social Security benefit collected by a retired worker over 65 years of age.

As of July, 1948, there were approximately 3 million workers covered by some form of health, welfare or pension benefits under collective bargaining agreements—that is, under labor contracts. Of this number, approximately one-half were protected by pensions. No reliable statistics are available at the moment to indicate the increase in such agreements during the past two years, although it is obvious that the advance might possibly double the aforementioned figures.

Headlines Often Misleading

Labor leaders displayed extreme interest in the recent agreement whereby 30,000 workers of Consolidated Edison Co., of New York City, were assured of a minimum pension of \$125 a month, which figure was widely regarded as breaking through the \$100-a-month pattern in other industries. The \$125 figure is misleading, however, because it is subject to deduction by the amount received by an individual through monthly Social Security payments.

This Social Security deduction from announced round-figure monthly pension payments seldom makes the headlines, it usually being buried in a small-type recap of a given agreement's terms. This is why we say that the pension plan of Chicago Local 110 is outstanding in that all retired members receive \$100 a month irrespective of income from any other source, and, moreover, it is contributed exclusively by the employer, the worker having to pay nary a penny.

• G. L. (Pappy) Luther, business representative for Local 715, Gainesville, Texas, called our attention to an item that appeared in these columns last month

relative to Lester F. Hall, member of Houston Local 279. We stated that Hall was instrumental in organizing Gainesville Local 715 while a student at the University of Oklahoma. Pappy Luther makes a slight correction to the effect that Local 715 was originally in Norman, Okla., but that extended litigation with the Griffith Theaters destroyed the Local. In 1946 the IA gave Charter No. 715 to Gainesville, Texas. The Griffith Theaters, operating in Texas under the name of Theatre Enterprises, Inc., is now engaged in a bitter dispute with the Gainesville Local. The officers of Local 715, however, are determined to see the fight through to a victorious finish.

• The two labor groups in Massachusetts, the AF of L and the CIO, have confronted Governor Dever with a difficult political decision. Three years ago Benjamin G. Hull, member of Springfield Local 186 and a senior vice-president of the Massachusetts Federation of Labor, was appointed associate commissioner of labor and industry by former Governor Bradford. Hull's term of office, during which time he has helped settle some of the state's most serious labor disputes, expired January 31 last, and he has the full support of the AF of L in his quest for reappointment. However, Governor Dever is being pressured to appoint a CIO man to the office. Heretofore the AF of L and the CIO (in Mass.) have worked

closely together on all political appointments, and it is hoped that this present situation will be smoothed out without giving rise to serious squabbling.

• Vincent (Red) Medina, member of Providence Local 223, is basking in the reflected glory of his relationship to the New York jurist, Judge Medina, who presided at the recent trial of the 11 convicted communists.

• The Spring, 1950, issue of the *IA Bulletin* reproduces under the heading "Does Anybody Have an Older One?" an IA projectionist working card issued on December 13, 1909, by the old Cincinnati Local 165 to Mitchell Meyer, who recently retired as a member of Local 327 after 43 years in the craft.

We have received from Morris J. Rotker, of New York Local 306 (see "Presenting: Morris J. Rotker" in IP for Jan. 1950) a card issued to him in 1908 by the old Local 35 which is headed "Working Card—Picture Machine Only," the physical condition of which prevents its reproduction here. Morris sure goes 'way, 'way back; but we're not so sure that he wins the old-card sweepstakes. How about it, fellows?

• Harry H. Lackey, who succeeded the late George Vleck as business representative for Local 327, Utica, N. Y., has made excellent progress during his short tenure of office in gaining benefits for his membership. He recently concluded 13 new three-year contracts calling for yearly increases ranging from 10 to 14%. The agreements also provide for time and one-half pay for overtime, and also eliminate all, so-called "grace periods." Harry was elected a delegate to the Utica Federation of Labor, and will also represent his Local at the forthcoming IA Convention in Detroit.

• A dinner-dance marked the 35th anniversary celebration last month of Local 384, Hudson County, N. J. Top IA executives and officials from many neighboring Local Unions were numbered among the guests. A highlight of the evening was the presentation of a gold wrist watch

'Spurious' Labor Publications

A warning that "spurious" labor publications appear to be on the increase was issued by the National Better Business Bureau. The publications, according to the bureau, usually masquerade under a name which resembles that of a legitimate labor group, or one which is similar to a recognized labor publication. "High-pressure solicitors attempt to sell advertising and in numerous reported instances threatened business concerns with labor trouble if they did not authorize ads," the report said. Members were advised to contact the bureau if in doubt about any labor publication.

to Tony Boscarelli, former business representative, in recognition of 35 years of loyal service to the labor movement. Presentations of pen and pencil sets were also made to members holding cards in the Local for 25 years or more.

- The pattern of living in Louisville, Ky., fits in so nicely with the ideas of Jack Behlke, member of Chicago Local 110, that he plans to make it his home when he retires from active work. A recent visit there, as field representative for Motiograph, Inc., convinced Jack that nothing would make him happier than to spend his days of retirement in the Blue Grass State.

- The members of the IA General Executive Board will long remember the hospitality of Vancouver Locals Nos. 348, 118, F F-71, B B-71, and T B-72, shown them during the recent mid-winter meetings. Dinner parties, sightseeing trips and open-house get-togethers were some of the planned activities for the delegation. President Walsh was invited to sign the Vancouver City Hall guest book, which boasts of such distinguished signatures as that of the King and Queen of England, the Lord Mayor of London, Pandit Nehru, the Lord Mayor of Sydney, Australia, and many other distinguished visitors from all parts of the world.

In commenting on the signal honor of being the first labor official invited to sign the guest book, Walsh said "... nine years ago the IA was being kicked out of everywhere, and I am glad of the opportunity of seeing it invited back where it belongs."

- Ed Dougherty, member of Local 384, Hudson County, was elected president of the "Wacky-Ups," a New Jersey theatrical organization.

- Bill Barrett, 8th IA vice-president and business representative of Hollywood Local 80, suffered a fatal heart attack two days after his return home from the IA Executive Board meeting in Vancouver, Canada. Funeral services, which were held on Wednesday, March 29, at the Sacred Heart Church in Los Angeles, were attended by an IA delegation headed by President Walsh.

- A letter from Tobe Petre, member of Toledo Local 228, informs us that he is one of the first men to run sound pictures in the city of Toledo, having operated Warner Bros. Vitaphone at the Old Temple Theater. Petre's affiliation with the IA dates back to 1913 when he first became a member of Local 626, Nashville, Tenn., transferring his membership to the Toledo Local in 1919. With the exception of 13 months' service with the Signal Corps in World War I, he has spent the past 37 years of his life work-

ing at the craft—a record of which he is justly proud.

- The first of a series of five bowling match games between the Detroit Nightingales (Local 199) and the Cleveland Local 160 Club resulted in a victory for the Cleveland team. The opening of the 1950 series was celebrated by a banquet tendered by the Detroit team, with Bill Kunzmann, of National Carbon Co., as the guest of honor. Tom Fitzgerald and Mike Sawdo, of Cleveland, were among the invited guests.

- After rejecting a 19¢-per-hour increase granted to the projectionists working for the Odeon circuit by the Conciliation Board of Canada, Vancouver Local 348 accepted a straight 25¢ hourly wage increase, retroactive to September 1 last. A similar agreement with the Famous Players circuit was signed several weeks ago. All but six of the 30 independent houses in Vancouver have settled on the same terms, with the few remaining die-hards expected to fall in line shortly.

- Father Time still on the march. Walter Tinney, business representative of Local 678, Laredo, Texas, and with whom we cut many a caper in our younger days, is now eligible for the old rocking chair. Walter, Jr., also a member of the Local, is now a benedict, having recently married Miss Anna Miller of San Antonio.

- *Out-of-town visitors:* Larry Sabatino, Westchester County Local 650; Eugene V. Mathis, Local 462, Vineland, N. J.; Harvey Sapp and Ed Dougherty, Hudson County Local 384; Kenneth S. Mack, J. Walter MacCracken, Easton Local 203; Michael Keegan, L. Campbell, Scranton Local 68; Sam Rubin, Harrisburg Local 488; P. J. Gallagher, Wilkes Barre Local 82; Edward Friedman, Donald E. Ball, Scranton Local 329; H. D. Helsel, Williamsport Local 411.

- Projection people everywhere—and we mean throughout the world—will be glad

to learn of a long chat we had with P. A. McGuire ("Better Projection Pays") on the occasion of his 75th birthday last month. Retired for several years now, Mac still maintains a lively interest in

P. A. McGuire, IPC-Simplex stalwart for many years and champion of the art and the craft, observes his 75th birthday with renewed insistence that 'Better Projection Pays'—and pays, and pays.



projection and continues to give out with penetrating comment on developments within the art and the craft.

Mac's birthday was marked by the receipt of personal messages from every executive and scores of others in the International Projector and National Theater Supply companies, no less than from countless others in the field. Notable was the receipt by Mac of the color brochure relating to the new Simplex X-L projector to which were affixed the names of more than 200 projectionists, members of the 25-30 Club, who attended a special demonstration of the new mechanism at the Bloomfield plant. Harvey Sapp, member of Hudson County Local 384, gathered the signatures and presented the brochure to Mac.

When we say "Good luck and good cheer, Mac" we know we speak for all the boys.

- A record of working at the craft for 43 consecutive years is claimed by Arthur Pakula, former secretary of Local 603, Raleigh, N. C. Arthur's career began back in 1907 as a rewind boy, a job he kept for three years. In 1910 he became a full-fledged projectionist, thus making him one of the first projectionists in North Carolina.

Arthur has been an active Mason for many years, and in 1935 he became the 75th Master of Hiram Lodge No. 40, A. F. & A. M. He is a certified lecturer of the Grand Lodge of his home state, participating in all Masonic activities. In 1943 the Supreme Council of the Scottish Rite conferred upon him the honorary degree of Knight Commander of the Court of Honour.

Arthur served 28 years as secretary of Local 603, being succeeded at the recent elections by G. C. Scarlette, Jr.

- It is with deep regret that we report the death on April 1 of George Edwards, a former president of New York Local 306. Ever a fighter for that which was right, and invariably on the side of the



underdog, George was widely known for his many years of unselfish work in the affairs of the American Projection Society, the official journal of which he edited for many years without one penny's compensation. In fact, George gave generously of his own funds in order to keep the organization alive.

A firm believer in craftsmanship, George held the craft deeply in his debt by his constant insistence upon education. "Competency" was the gospel he preached with the utmost sincerity and a determination that he be heard. He was heard, and clearly, to the limitless advantage of the craft.

George Edwards will be sorely missed as a staunch unionist, a wise counsellor and, above all, as a fine man.

• From the projection room to the mortuary is the jump recently effected by Arthur Smet, member of Local 195, Manchester, N. H. Arthur is now devoting his full time to the undertaking business—a venture he probably finds more profit-

able and exciting than running a projection machine.

• Not content with his re-election to the presidency of the Columbus Federation of Labor, Robert W. Greer, president of Local 386, is seeking further honors on the political front. He recently announced his candidacy for committeeman on the Democratic ticket.

25 Years Ago—April, 1925

The IATSE and the United Brotherhood of Carpenters reached an agreement on the jurisdiction of work in the West Coast Studios. . . . Widespread talk about the so-called "safety-film." . . . Warning sent out by New York City Local Unions regarding unemployment situation advised out-of-town members not to come to New York seeking employment. . . . The *IA Bulletin* to be issued monthly instead of twice a month. . . . Representative Bill Dillon completely recovered from his recent illness. . . . William Green, who succeeded the late Samuel Gompers as president of the AF of L, appointed a committee to take charge of a fund-raising campaign for the erection of a suitable Gompers Memorial. . . . George Brown, an officer of Local 577, San Bernardino, Calif., expelled for misappropriation of Local funds. . . . Theatrical world alarmed by

threat of radio. Meeting of Actors' Equity Association called to discuss ways and means of combating inroads made by this new art. . . . The crossword puzzle craze another reason advanced for the slump at box-office. . . . General Office again issued a warning that Local Unions must handle theatrical trunks coming into theaters. Local Unions waiving jurisdiction over this work to be penalized. . . . Local 510, Fargo, N. Dak., expelled John P. Welsh for working in theater on Official Road Call. . . . Call issued for the meeting of the 8th District at Terre Haute, Ind., on Sunday, May 3, 1925. . . . IA Representative Krouse settled two-year controversy between Pottsville Local 218 and the Higgins Enterprises.

• "Absolute tops" is the advance word passed along by Joe Cifre, general chairman, in referring to the forthcoming Ruby Jubilee Banquet of Boston Local 182 to be held at the Copley Plaza Hotel, Boston, on April 24. Two orchestras will provide almost continuous music from 8 p.m. until 3 a.m., during which time there will be served a dinner which Joe can only describe by the word "sumptuous."

Among the honored guests at this 40th anniversary party will be U. S. Secretary of Labor Maurice J. Tobin, Governor Paul A. Dever of Massachusetts, and IA delegation headed by President Richard F. Walsh, and many state and city officials.

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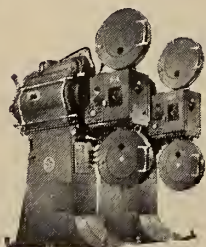
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The appended comment was culled from the "Australian Standards Quarterly."

The *casus belli* was a letter from the American Standards Association advising that ASA had long since adopted the terms "flammable" and "combustible," with the corresponding negatives "non-flammable" and "non-combustible," to avoid confusion sometimes experienced in the U.S.A. with "inflammable." The prefix "in-" it was pointed out, has frequently a negative sense.

In less time than it takes to say "Chambers Encyclopedia," the corridors and offices of the SAA (Standards Association of Australia) were echoing to the clash of metaphor on simile, the whine of meiosis, the shriek of hyperbole, and the muffled explosions of numerous theories. As reinforcements were summoned from various organizations throughout the Commonwealth, the small-arms fire of personal preferences and dictionary definitions was drowned by the heavy gunfire of official opinions.

'Inflammable' Gets the Nod

Finally, almost atomic in its crushing logic, came a comment from two separate Government bodies, to the effect that

"inflammable" was already solidly entrenched in Commonwealth and State Acts and Regulations. The use of "flammable" would, in fact, cause more confusion to Australians than the hitherto innocent (or shall we say "non-nocent"?) prefix "in-."

When the smoke of battle had somewhat abated, it was observed that the apostles of "flammable" had little more to offer (apart from cries of "Reactionary!") to this somewhat inflammable (or flammable) topic. Their opponents, however, turned a retreat into a rout with the following conclusive contribution to the brief but glorious passage of arms:

"If the prefix 'in-' is to be lopped off from words other than negatives, how's this for an office memo?"

"I am struced to form you that the more dustrious and telligent members of the Committee on Spection and Surance of Flammable Materials have been duced to refrain from attending meetings in a state of toxication."

IA ELECTIONS

LOCAL 165, HOLLYWOOD, CALIF.

Edward M. Egan, *pres.*; Howard Edgar, *vice-pres.*; Richard Hennley, *sec.-treas.*; George J. Flaherty, *bus. rep.*; Frank E. Chaney, Paul R. Cramer, Harold Masser, Leo S. Moore, Albert R. Pullen, *board directors*; Harold M. Corl, Clarence W. Offer, Harold G. Swanson, *exam. board*; E. M. Egan, G. J. Flaherty, C. Grohman, R. Hennley, *del. Central Labor Council*; J. J. Eddy, *del. State Federation of Labor*.

LOCAL 204, LITTLE ROCK, ARK.

Ernest L. Rush, *pres.*; Leonard Thalmuel, *vice-pres.*; Paynter Rochelle, *cor.-sec.*; Guy Redmond, *treas.*; Ira Baldridge, *bus. rep.*; Johnny Cowpland, *ass't bus. rep.*; Charles Cates, *sgt.-at-arms*; Ernest Rush, Boone Herring, V. T. Hardcastle, *trustees*; Jack Schoemaker, I. Baldridge, *del. IA Convention*.

LOCAL 266, JAMESTOWN, N. Y.

C. Hemphill, *pres.*; G. W. Samuelson, *vice-pres.*; Ralph H. Turner, *cor.-sec.*; C. Sparling, *fin.-sec.*; L. Ward, *treas.*; Wm. F. Stevens, *bus. rep.*; B. Brown, *sgt.-at-arms*.

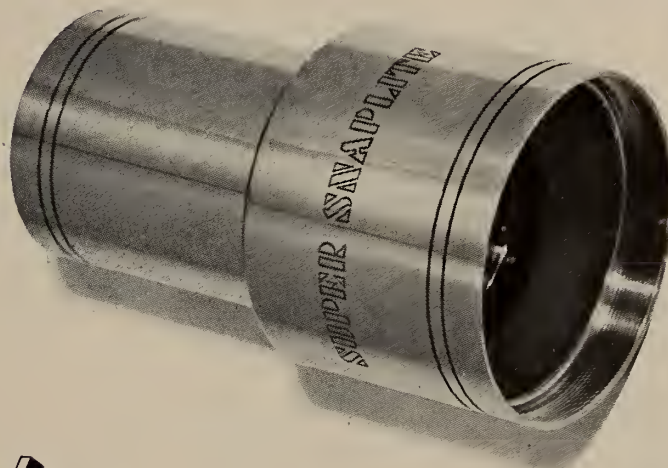
LOCAL 439, NEW LONDON, CONN.

James McClellan, *pres.*; John Kane, *vice-pres.*; Leonard Reed, *cor.-sec.*; Wm. Reed, *fin.-sec.*; Fred Nowell, *bus. rep.*; I. Dawley, C. Patterson, S. Patti, *trustees*.

LOCAL 571, PORTSMOUTH, OHIO

Paul Williams, *pres.*; Walter Cunningham, *vice-pres.*; Roy Reeg, *rec.-sec.*; O. H. Osborne, *cor.-sec.*; Everett Gahm, *fin.-sec.*; Fred Etzkorn, *bus. rep.*; R. Osborne, *sgt.-at-arms*; O. Osborne, *del. IA Convention*.

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Projection Pioneer: Walter A. Bemis

FIFTY-EIGHT years in show business, 54 of which were devoted to the projection of images of one sort or another onto screens, may not qualify a man for the title of No. 1 projectionist in America, but it will certainly project him right into the charmed circle of the first half-dozen such old-timers. This is the record of Walter Bemis who, now 72 years of age, still does a top-flight job of projection at the DeWitt Theater in Bayonne, N. J.

The Bemis birthplace in Jamaica, Ver-

mont, was in 1878 a far cry from Huber's Palace Museum and Theater on 14th St. in New York City, but that was where Walter wound up as assistant property boy at the tender age of 14 (a whopper made it 16). Huber's was in truth a museum, for it presented a conglomerate collection of freaks ranging from Rama Sama, the Wild Hairy Man and the Human Seal down through the Siamese Twins and Rattlesnake Jack.

Bemis ran slides before Huber's got its first movie projector, a Jenkins. Two

noted old-time projection men helped Bemis a great deal—Jean A. Le Roy, now on the SMPE Honor Roll, and Willie Brinkman, who worked with the Edison Kinetoscope.

Among the early pictures shown at Huber's were Mary, Queen of Scots; The Guillotine, The Life of a Fireman, Black Diamond Express, The Welsh Rarebit Fiend, and, of course, The Great Train Robbery. A clever bit of faking in The Guillotine simulated an actual beheading, but so many women patrons fainted in their seats that this section was deleted.

Projection Ambidexterity—Plus

Bemis once was delegated to sell an Edison machine to a summer resort. The film used on one of the first shows was full of one-hole misframes. The lamp, which had a small rod to feed the carbons via an up-and-down movement, got loose on the stand. Not wanting to stop the show, Bemis held the lamp in place with his left hand, fed the carbons with his little finger, turned the crank with his right hand, and framed the film with his mouth—the framing rod being on top of the projector head.

Bemis joined T.M.A. Lodge No. 1, of N. Y. City, in 1903—and therein hangs a tale of the benefits of fraternal association. During the summer of 1904

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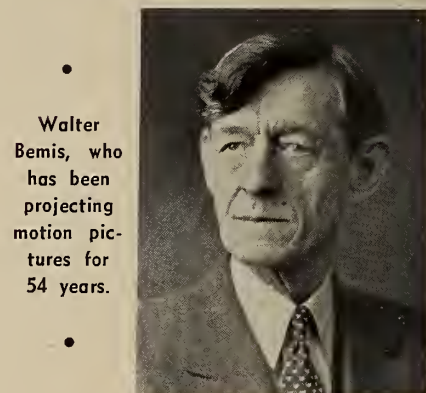
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Walter
Bemis, who
has been
projecting
motion pic-
tures for
54 years.

Walter worked at a Coney Island theater: hours 11 a.m. to midnight—no supper relief. A season of this put Walter into the hospital, and for six months thereafter he was taken care of by both the T.M.A. and the Actors Fund.

Leaving Huber's in 1906, Walter then went to work for Adolph Zukor, subsequently head of Paramount Pictures, in his Atlantic City theaters. A "sweet" job was at Loew's Lyric Theater in Hoboken, N. J. To hold this job Walter had to work the Manhattan Opera House, N. Y. City, on Sundays; to get a day off he had to quit both jobs.

And so it went down through the years. Unionism was growing apace with the film industry, thus Walter joined Local 35, N. Y. City in 1909; then transferred to Local 306, and finally transferred to Hudson County, N. J., Local 384 in 1915,

of which he still is an active member.

World War I saw Walter directing the activities of 21 huts and nine open-air movie theaters for the Y.M.C.A. at Camp Lee, Va. After the war he worked as electrician on ships at the Hoboken docks, but he soon returned to his first love, motion picture projection.

Characteristic of Walter Bemis was his visit when 65 years old to the Social Security Board. Entitled to retire with benefits at that time, Walter told the S.S. people that they had nothing that would interest him then but he might be back in ten years or so and have a chat with them.

The Bemis philosophy matches that of almost all of the old-timers in the business and may be boiled down to that old adage of "an honest day's work for a fair day's pay"—and this even when the 12- and 14-hour daily grinds were tough to take. Walter avers that even if one feels he is being imposed upon, the manly thing to do is to chuck the job rather than to attempt to cut a few corners. Once a man loses his pride of craftsmanship, says Walter, he can't regain it at will; it's gone.

A real trail-blazer was Walter Bemis, of the breed whose contributions to the development of the industry and, more important, to the growth of unionism, smoothed the path in terms of working conditions and wages for those who followed them.

NEWS PROJECTIONS

Jottings of happenings which, while mostly of a non-technical nature, have a bearing upon general industry welfare and progress.

PROFITS of major distributors continue to hold up, in some cases exceeding the "good" year of 1948, the while box-office receipts are in an obvious sharp decline. Naturally, when the film alone not infrequently costs a theater 65% of its total take. . . . Nice helpful gesture by Bob Hope and other film luminaries in appearing on Star Spangled Review over CBS Tv on Easter Sunday from 5:30 to 7 p.m. Theaters should exploit his and the others' next pictures to the limit—so as to make him an even bigger Tv attraction. . . . Some Congressmen predicting a sharp downward revision of excise taxes by July 1. Picture business hopeful of getting at least a 50% slash in current 20% tax bite. . . . For six months ending last Dec. 31 Columbia Pictures reports a net profit of \$945,000. . . . Great-minds-at-work dept.: Sid Rogell, exec. producer at RKO, proposes that all industryites wear a button stating "I am a Booster" as an antidote for gloomy talk of box-office recession.

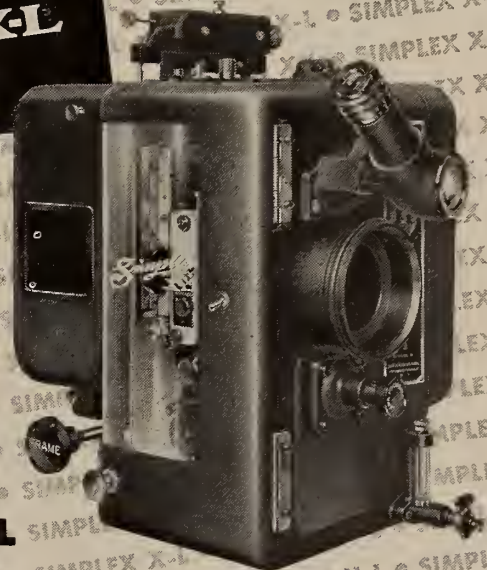
Surprise for those bewailing the ab-

sence of short subjects from theater screens: Paramount will make 58 shorts during 1950-51, including six 2-reelers, in addition to 104 issues of Paramount News. . . . Famous Players Canadian circuit has applied for a theater Tv permit. . . . "The Stratton Story" was Canada's top box-office pic in 1949, and Bing Crosby for the sixth straight year was the Dominion's top movie attraction. . . . Industry toppers now say that installment buying is a major factor in b-o decline. . . . As soon as the FCC approves the CBS color Tv system (not expected in the immediate future) the network will provide 20 hours of color Tv weekly. . . . United Kingdom will not cut imports of American films this year.

provided the national economy maintains its present level. . . . No decision on Tv channels is expected from FCC before next Fall. Exhibitor outfits will go ahead with coordination plans in the interim. . . . Water shortage in various sections of the country will hurt box-offices severely unless theaters adopt a re-circulating attachment now being made available. . . . Crosley Broadcasting Corp. has purchased 65 J. Arthur Rank feature films, *all made in Britain within the past three years*, for its Tv outlets in Cincinnati, Dayton and Columbus. Pics will be shown Sunday afternoons.

Metropolitan N. Y. circuit heads are

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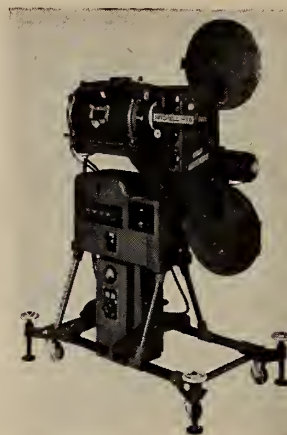
mulling widespread use of "flesh" acts as the answer to video competition. Notion is that live talent would replace the second feature on bills. . . . Paramount Pictures has bought 84,610 shares of its own stock from Jan. 1 last to March 23, in a move to further shrink its capital structure. Moreover, Par now has a standing offer until May 4 at least of \$21 a share for its stock, now selling at 20 $\frac{1}{4}$, in the open market. . . . Balaban & Katz Circuit in Chicago is offering a \$1.50 box of Bunte chocolates free with each \$5 book of script tickets purchased. Circuit has also moved back by one hour to 6 p.m. the time when advanced evening scales become effective. . . . Tipoff? Night baseball, just starting in balmy climes, is off sharply from last year.

Film catalog listing more than 1000 titles suitable for Tv, first of its kind in the industry, has been mailed to all ABC-TV affiliates. . . . DuMont Labs has applied for listing of its Class A common

stock on the big board of N.Y. Stock Exchange. . . . Chicago 3% amusement tax collections from theaters for first three months this year are off \$75,746, or about 22%, compared with comparable period last year. . . . Dept. of Justice asking Supreme Court to shorten "considerably" the three-year period originally granted for divorcement of producer-distributor theaters.

New Mitchell 16-mm Projector

Mitchell Camera Corp., Glendale, Calif., announces a new professional 16-mm projector. High-intensity arc or incandescent lamp projection is elective, and the unit is designed to use professional 35-mm sound equipment. The projector frames its picture in the same manner as better professional 35-mm projectors do, by altering the pull-down of the film by the movement while run-



The new Mitchell 16-mm sound projector, which is available with either Mazda or carbon arc light source.

ning, an outstanding advance in 16-mm design. A precision one-cycle movement is used, with a triple claw pull-down allowing use of film even with one or two torn perforations. Film tension may be changed while the projector is running, as in professional 35-mm projectors.

The projector is completely encased. Ball bearings are used throughout, and precision-cut gear teeth are automatically lubricated by running in oil. The projector may be tilted 12 degrees up or down. A 2-inch lens projects a sharp, clear image. Lenses of longer focal length may be used. The new projector threads easily and has plenty of finger room. Optional speakers, microphone jacks, turntables and other accessories are available. 2,000-foot reels are used.

Further information on both arc and incandescent lamp models is available from Mitchell at 666 West Harvard St., Glendale 4, Calif., or Theodore Altman, Room 710, 521 Fifth Ave., N. Y. City.

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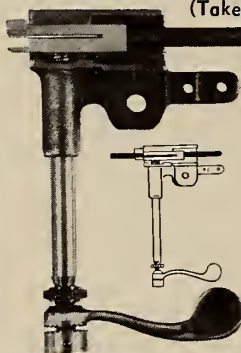
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- That takes a full trim . . . and holds it absolutely steady.

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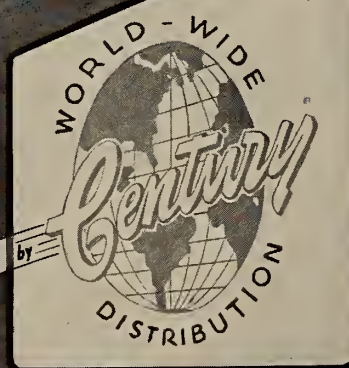
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New York, N. Y.

Largest Circular Photo Plates

Seventy dozen of the largest circular photographic plates ever used by astronomers are being rushed to completion by Eastman Kodak. The infra-red and blue-sensitive plates will be used on the expedition of Harvard University astronomers to South Africa.

The plates will be used with a new type of telescope and the world's largest objective prism to study more than one million stars and other interstellar bodies, and to photograph the center portion of the Milky Way, more than 30,000 light years from the earth. Present telescopes have been limited to detailed explorations of stars less than 10,000 light years distant. The special plates, 10 $\frac{1}{2}$ " in diameter, are being coated with emulsions especially sensitive to light of different colors and long exposures to faint light.

J. E. Robin, Inc., to East Orange, N. J.

J. E. Robin, Inc., has moved its offices from the McGraw-Hill Building, West 42nd St., New York City, to 267 Rhode Island Ave., East Orange, New Jersey,

TELECASTS

(Continued from page 19)

ers—the theaters. The Zenith executive conceded there will always be film theaters in operation, but opined that only 40 to 50% of the present houses can survive, and then only if they have "great" films.

Bonfig declared Zenith already has sufficient films to offer a movie a day during the 90-day test of Phonevision authorized by FCC for Chicago. He said the company had been offered films ranging from 1937 vintage product to films not yet released.

16-Film, 4-Party Phone Setup

Col. John R. Howland of Zenith opined that all television stations would want Phonevision. He speculated that in cities with more than one station, possibly the telecasters would offer Phonevision programs for a fee on an alternate basis, using the sponsored no-charge and public service programs on other occasions, thus giving the public an opportunity of either purchasing a desired program or seeing what is offered without charge.

Zenith's equipment, Howland said, can handle up to 16 films at a time, thus giving a choice of films on a four-party telephone circuit, providing there are Tv stations to telecast the films.

* * *

Du Mont Big Tv Tubes

Emphasizing the trend toward larger Tv images is the announcement by Du Mont Labs of the development of a 30-inch diameter Tv tube, with a 600-square-inch picture, to be released in the fall. Even larger direct-view tubes, including one of 4 by 5 feet, are forecast.

The new 30-inch tube's screen area is three times that of the 19-inch tube already in general use and believed to be the right size for the home, which fact indicates that the former will find its chief application in public places such as schools, clubs, restaurants, hotels and hospitals.

The rectangular type of tube will eventually supplant the circular type, with this transition taking place within the next 24 months, Dr. Allan B. Du Mont predicted. The new 30-inch tube, however, will be round, as are the other present-day tubes. Dr. Du Mont also predicted that it would take at least nine more years before there would be a color Tv system to compare in quality, trouble-free operation and economy with present black-and-white sets.

* * *

Century-Reeves Big-Screen Tv

Professional large-screen television has been added to the Century Projector

Corp. line of regular and drive-in theatre 35-mm motion picture equipment. The Tv unit, to be manufactured by Reeves Soundcraft Corp., will be known as the Reeves Videon Projection Tv, to be distributed through all Century dealers.

The Reeves Videon is available in screen sizes of 3 x 4 or 6 x 8 feet, with larger sizes expected to be announced later. The picture image is said to be of high resolution and brilliance, with sound quality on a par with the best available anywhere.

Flexibility, Remote Tuning

The system is completely flexible, with no bulky cabinets or platforms to take up valuable floor space. Either front or rear projection may be employed. Remote tuning up to 100 feet from the screen is possible, with all controls necessary for tuning, picture brilliance, contrast and sound being located in the remote master control unit. Reeves Videon may be installed in any theater lobby or lounge, and it may be installed in small art theaters when the audience capacity is small (200 or 300 seats), using the 6 x 8 foot screen under ordinary lighting.

* * *

Par Now Serves 25 Tv Stations With Class Kinescope Film

Paramount is supplying more than 25 Tv stations with kinescope recordings of high-Hooperated shows emanating from the company's Los Angeles video outlet, KTLA. This makes possible (1) the availability to stations not connected with coaxial cable of high-quality programs on film at lost cost, and (2) a potential source of significant revenue from this

branch of the film company's activities.

Basis of the plan was the realization that low-cost programming was of primary importance if television was to grow as quickly as possible. New stations not connected to coaxial cable faced obvious limitations in their efforts to offer top-quality original live-action programs. In addition, many stations affiliated with a major network found that the cost of sustaining original network programs was too high. Paramount turned to its Los Angeles outlet as a source for material.



SAM PASQUA—Owner of the Pasqua Theatre, Gonzales, La.—says:

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LETTERS TO THE EDITOR

To the Editor of IP:

The last (March) issue of IP is a fine example of how informative and instructive your publication is for the projectionist. I do hope that the Powers movement will be discussed by A. C. Schroeder in his articles on the intermittent movement. I often wonder why projector manufacturers don't utilize this type of movement. The higher ratio would be a big help on 35-mm Tv projection adaptation and the film today can stand such a movement.

I have yet to hear any good sound reproduction on the 16-mm subjects they use for Tv. I have seen very few Tv shows that would satisfy the public if they had to pay an admission charge for such shows. A majority of the shows

are pretty bad; but I suppose our loss is the opticians' gain.

The articles on air-cooling are O. K., but it does seem that the manufacturers could get together and agree upon the most efficient cooling method.

Urges Manufacturer Cooperation

"A Manufacturer's Casebook" is very good indeed, and Harry Strong is to be congratulated for providing his service files for such an article. Other manufacturers should do likewise.

The "Projectionist Examination Questions" is also a good item, if only to make some of our complacent fellows realize that they don't know everything there is to know about projection.

Articles like "Progress in Carbon Arc Lighting" and "The Trend in Drive-In Theaters" are always acceptable and instructive, and I consider R. A. Mitchell's series on film stock excellent. I failed to note any mention of the slight scratches made in the film during processing: when these are projected several times they fill-in with dirt and make for inferior screen images.

What has happened to the Standard Release Print? We are now running "The Girl From San Lorenzo" (Columbia) which has *no cue marks at all*. Some bright boy corrected this deficiency by putting "hen tracks" 25 feet from the end of each reel. Believe it or not, I find that Du Pont nitrate stock is the most difficult to splice.

W. E.'s Impressive 'Oscar' Record

The "Oscar" awarded to 20th-Fox for recording work on the film "Twelve O'Clock High" marked the 17th time that Western Electric recording equipment has won in the 20 years that this Academy award has been established.

"Basic Soundhead Dimensions" touches on something that has always been a headache. Remember the days of shimming? It is good news that Technicolor will up its print capacity. It seems to me to be time that color was used for news and sports coverage in order to combat Tv. Expensive? Sure; but so is the lost movie theater patronage.

SYDNEY T. CLARKE

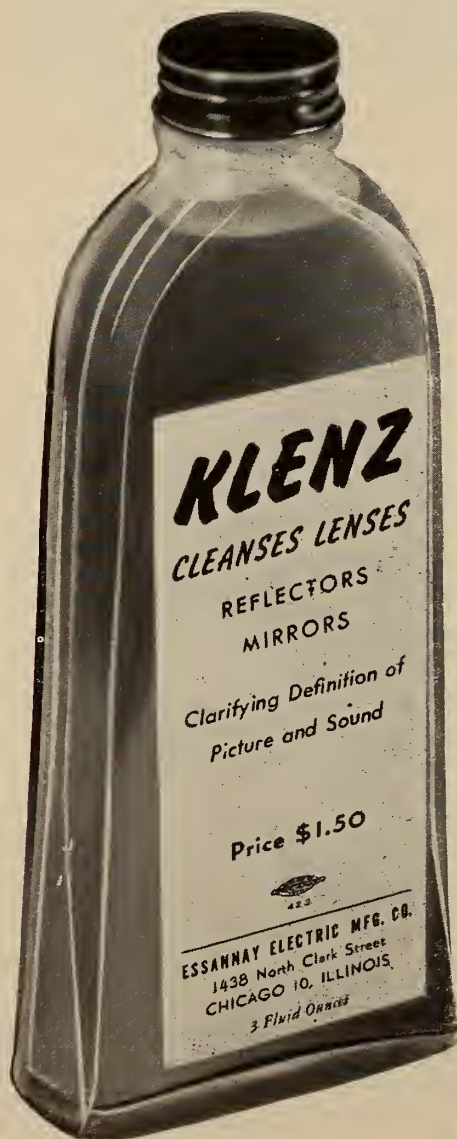
Secretary Local 223, Providence, R. I.

To the Editor of IP:

I feel compelled to tell you again how much I enjoy your magazine. As an engineer with radio and Tv experience, along with a smattering of movie work, I find IP absorbing. I'm not in the habit of writing "fan" letters, but your March issue was excellent and earns you congratulations on an outstanding journal.

JOHN H. BATTISON

Associate Editor, *Tele-Tech*



HENRY PRECIADO—Owner of the New Rex Theatre and El Rio Drive-In Theatre, Madera, California—affirms:

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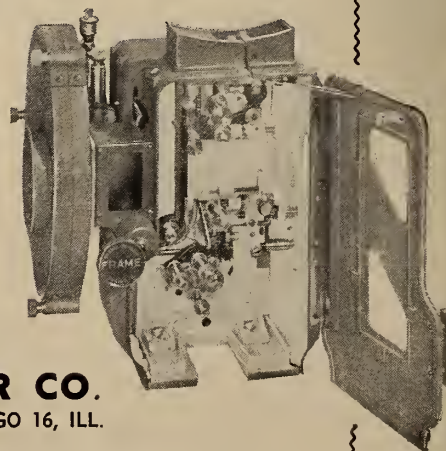
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THE 35-MM PROJECTION POSITIVE FILM

(Continued from page 8)

perfectly flickerless picture on the screen. The shutter of the Bioskop closed off one lens at the same time the other was being opened, thus the individual snapshots were flashed on the screen in normal, consecutive order, and the screen was never dark.

Each Skladanowsky film-subject lasted only about 6 seconds on the screen, but since the films were made into continuous loops, they repeated themselves every 6 seconds. Among his films we find street scenes, wrestlers, acrobats, dancers, and even boxing kangaroos! After playing at the Wintergarten, Skladanowsky exhibited his very popular "lebende Photographien" in *veau de ville* theatres all over northern Europe.

First Lumiere Public Showing

On December 28, 1895, the Lumières gave their first public entertainment performance with their Cinématographe in the Grand Café in Paris. The Lumières presented the first movie show in London in February, 1896.

The next important step in projection also took place in London. Robert W. Paul of that city built several projectors and cameras, and he also produced films similar to Edison's. Paul installed one of his machines (the Theatrograph) in the Olympia Theatre, and another (the Animatograph) in the Alhambra. This brings us up to March, 1896. The following month focused attention upon America.

Discounting the dismally unsuccessful projection attempts of the Lathams in a store on Broadway of New York City on

May 20, 1895, the first commercially successful projection of motion pictures on this side of the Atlantic was that performed with Thomas Armat's Vitascope at Koster and Bial's Music Hall in New York on April 23, 1896. The films shown were made by Edison and Paul, the proper speed of these being 46 frames per second. The quality of the picture was much inferior to that attained by the Lumières.

We must wait until late in 1896 and return to Germany to witness the first exhibition of a film which was to set the standard for the motion picture industry until the advent of sound motion pictures in 1928.

Messter Set Standards Pace

Otto Messter of Germany happily combined Edison's film specifications (35 mm wide, 16 frames to the foot, and 4 oblong sprocket holes per frame on each

edge) with the Lumières' rate of travel (16 frames per second). Messter's projector, too, was the first to employ the standard type of Geneva (Maltese-cross) intermittent movement. The first exhibition of Messter's films took place on November 1, 1896, in the Apollo Theatre, Berlin—one year from Skladanowsky's Wintergarten exhibition.

IT MAY BE SAID THAT THE STANDARD MOTION PICTURE FILM WAS BORN IN THE APOLLO THEATER, BERLIN, NOVEMBER 1, 1896.

Messter's motion picture film standards were immediately accepted by all cinema technologists in France and England, and soon after by projector and camera designers in the United States and other countries.

Now let us leave Europe and come to America, a country which was to assume the unquestioned lead in all things cinematic a little over a decade later (1913).

Five Teca In-Car Speakers

Five new models of in-car speakers, one to fit every price bracket, have been developed by Teca Mfg. Corp., Toledo, Ohio, it is announced by Al Boudouris, president. Exclusive features of Teca speakers include instant disconnect terminals on speaker cables, no tools being required. A 4-inch driver unit makes full use of cavity resonance, resulting in better base response. All units are guaranteed for two years.

Teca speakers have been submitted to a salt spray test which meets joint Army-Navy specs for corrosion proofing. The driving units are fungus- and moisture-proofed, and the transformers double hard varnish vacuum impregnated. Lines and downlight circuits may be tested without opening the junction box.

End posts are equipped for "stop" and "go" lights. The junction box is translucent. Teca speakers will hang on the car door even when the window is all the way down. Full details from Teca at 106 Michigan St., Toledo 2.



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when the first American feature film was made). We find in the United States during the decade 1900-1910 an almost endless number of cameras and projectors being designed and built. (Even Thomas Edison built a projector when his peephole machines lost their popularity in the overwhelming influx of projected motion pictures.)

We find also a torrent of films pouring in from France, Germany, and England, and the French Pathé productions were especially popular. And we find the tiny acorns from which were to grow the mighty motion picture palaces of tomorrow, the "nickelodeons" where for the admission fee of five cents the patron could enjoy a thrilling 15-minute program of the wonderfully lifelike "movies."

Evolution of Film Lengths

The earliest films were very short. At the turn of the century a 200-foot roll of 35-mm raw stock was about the longest obtainable in one unspliced piece. The first notable American dramatic film, "The Great Train Robbery" filmed by the Edison Company in 1903, was not even as long as a present-day prevue trailer!

The longest films "tolerated" by cinema audiences prior to 1911, the year when European multi-reel feature came into vogue, seldom exceeded 2000 feet. Most "features" were only about 1000 feet in length (running time approximately 15 minutes at the standard silent-picture rate of 16 frames per second), hence 1000 feet of film became the standard length of a "reel" from the very beginning of theatre movies. Whenever a feature subject fell short of the full 1000 feet, the reel was sometimes filled out with a 100- or 200-ft. short subject in order to provide the nickelodeons with a full 15-minute program.

Manufacturers of film stock conformed to the arbitrary standard of film length by providing 35-mm raw positive in rolls of 1000 feet (300 meters). The designation of rolls of film from 750 to 1000 feet in length as "single reels" and those from 1500 to 2000 feet in length as "double reels" still persists. In fact, 35-mm raw stock still is commonly supplied in rolls of 1000 feet.

Introduction of Safety Film

The coming of sound-on-film recording and reproduction in 1928 made no change in the physical dimensions of film, but the rate of film travel was increased from 16 to 24 frames per second in the interests of sound quality. The lateral displacement and slight reduction in the size of the individual picture frames required by the addition of the soundtrack did not alter the number of frames per unit of linear measure, *viz.* 16 frames to the foot.

The development of non-inflammable



D. TURTURRO—Owner of the Elms Theatre, Millbury, Massachusetts—declares:

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(safety) film, while in no way affecting dimensional standards (except that it usually is made a trifle thicker than nitrate films to give them an acceptable degree of strength), is of historical interest.

The cellulose acetates were well known even before photographic motion pictures were made by Edison with his Kinetograph. The diacetate cinema film appeared in France in the earliest days of the Pathé Co., but its poor physical

qualities prevented its taking the place of film made from cellulose nitrate.

Nevertheless, diacetate base has been used for substandard films from the time when 16-mm film was introduced (1923) until 1937, when Eastman Kodak changed to acetopropionate base because of the superior characteristics of the latter.

According to Dr. Charles R. Fordyce (Eastman) acetopropionate safety film "was less subject to brittleness at low humidities and more resistant to dimensional change by moisture under varying conditions." Indeed, the release to theatres of several 1- and 2-reel films printed on acetopropionate stock was attempted during the war years of 1941 to 1945, but with decidedly unsatisfactory results.

Current Safety Film O.K.

Early in 1946, however, Eastman introduced a new "high-acetyl" type of acetate base which promised to be a sufficient improvement over both the diacetate- and acetopropionate-type film bases to permit its use as a replacement for the dangerously combustible nitrate film in the theatre field. This, a cellulose triacetate base, is the safety film in wide use today. It is superior to nitrate base in most respects, but markedly inferior in a few ways.

In the opinion of the E. I. du Pont de Nemours firm, high-acetyl safety film, "while not equal to nitrate base in certain properties, can be made to suffice until such time as superior products can be developed."

[CONCLUDING ARTICLE IN THIS SERIES]

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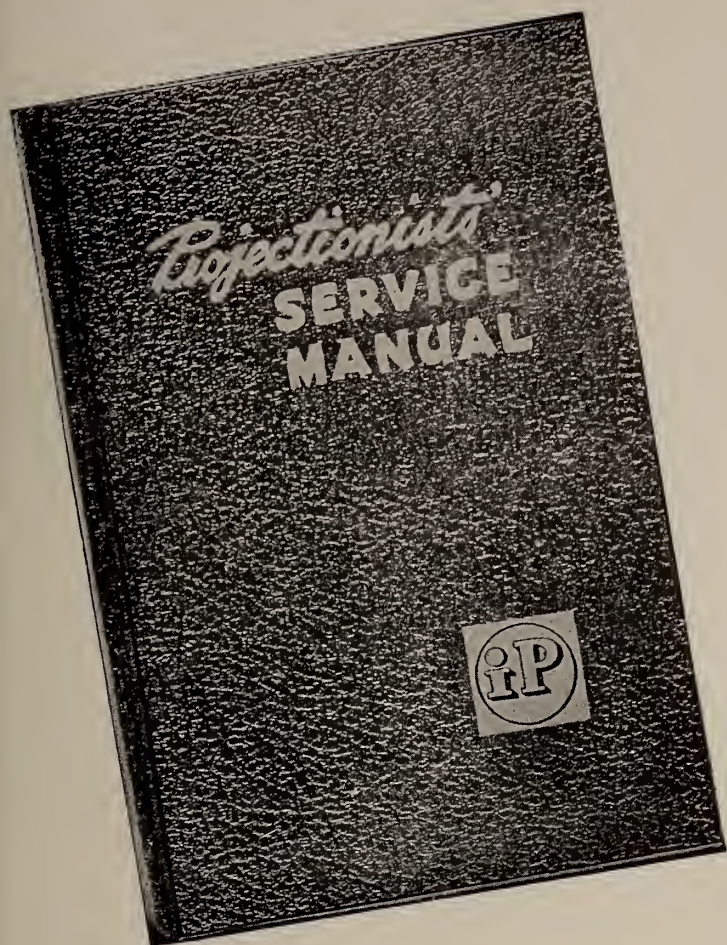
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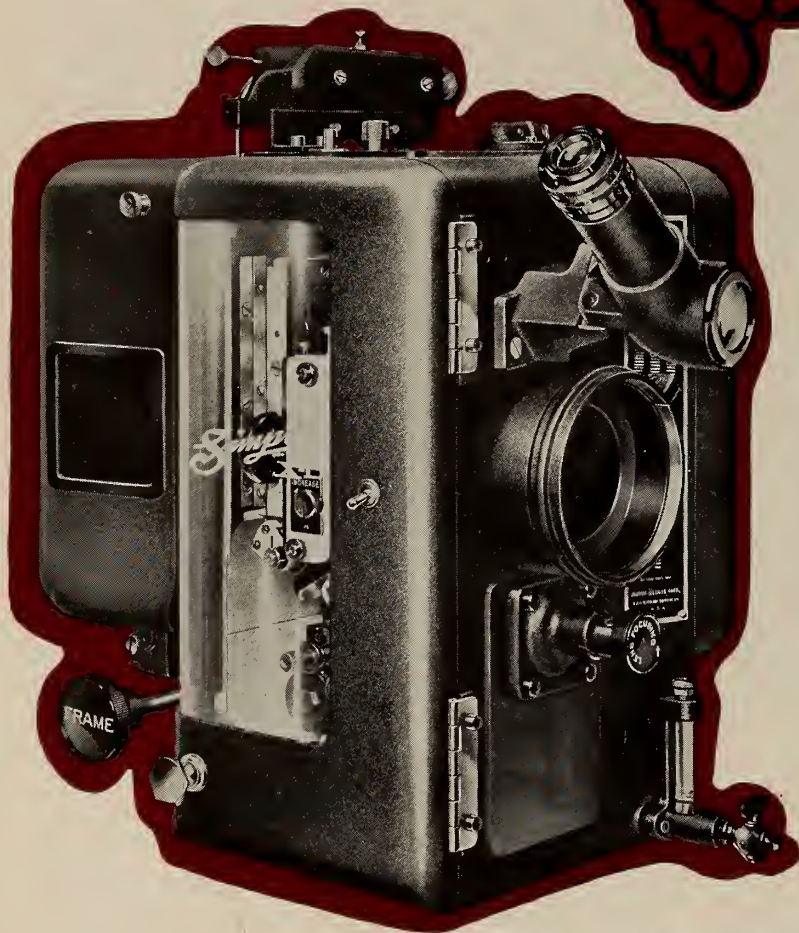
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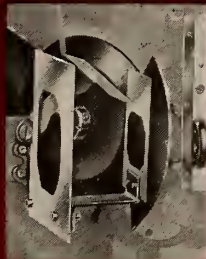
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HENRY B. SELLWOOD, *Editor*

Volume 25

MAY 1950

Number 5

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MONTHLY CHAT

THE ringing declaration by Spyros Skouras, prexy of 20th Century-Fox, at the recent SMPTE convention that his company would move immediately to organize a circuit of Tv theaters, at a cost of many millions of dollars, and the announcement that Paramount and a ranking research laboratory will shortly be able to demonstrate three-dimensional motion pictures—these happenstances set us to thinking of certain words which were set down in this same space in January, 1949. Excerpts from our observations of more than a year ago are appended:

No branch of the motion picture industry—from managers and projectionists in theaters on up through the studio artistic and technical forces to the higher echelon of management (and not forgetting those hard-headed fellows from Wall Street and its counterparts who supply the wherewithal)—everybody is aware of the tremendous task that confronts the industry in its life-or-death struggle to combat the many forms of entertainment which now compete with the film box-office dollar. Rampant though it be at the moment, television is by no means the only threat to the theater box-office; Tv merely intensifies the competition.

If the film industry is to continue as a healthy economic organism, it appears certain that the life-sustaining energy must flow from its technicians. Films must be made very much more appealing to the increasingly discerning eye of the amusement-seeker, not only in terms of story content and artistic execution but also by means of vastly improved technique in production and presentation.

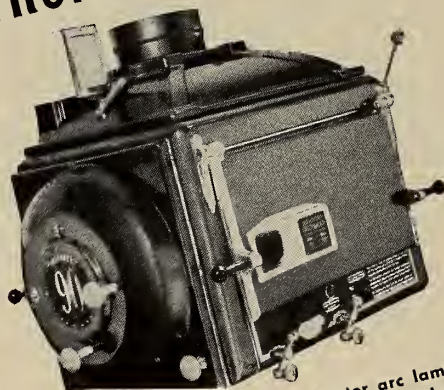
Three-dimensional pictures, stereophonic sound and greatly improved color processes are but three of the advances long promised by the film industry; but it begins to look as though the Big Brass executives have become very coy about putting money into technological developments on behalf of an industry which, while the source of their opulence and personal power, might possibly be in for a bit of rough going. Difficult of accomplishment though the aforementioned developments might be, complete candor compels the observation that they would be duck soup for that gang of technicians who have brought Tv to its comparatively high estate.

Mr. Skouras' words read well in the press; they must have sounded even better as they were delivered with seeming assurance by a top-ranking executive in the business. But it requires more than a mere pronouncement to make operative a plan which, involving the learning and eventual mastery of an entirely new form of entertainment programming, should have been in the planning stage at least five years ago and in the operating stage, in however a limited form, for the past two years.

The three technical improvements aforementioned—stereophonic sound, improved color processes, and three-dimen-

(Continued on page 25)

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The Geneva Intermittent Movement

PROJECTORS are more complicated than they would be if no framing device were needed. Probably the simplest device was used on the old Edison machines, where the entire mechanism moved up or down, and only the aperture plate and lens remained stationary. This was simple because the inside shutter moved with the mechanism, and the fact that this put the shutter out of time bothered no one.

An outside shutter was added later, which also moved with the mechanism but remained in time because the shaft was directly below the lens and did not change the relative time that the shutter entered and left the light beam as the picture was framed.

Powers had a fairly simple, although not entirely satisfactory, method of framing. Who doesn't remember the old toggle gear and the troubles it occasioned? When the picture was framed it changed the gear center distance, producing a bad condition. It was difficult to keep these gears quiet, and when the gears, toggle lever, *etc.*, wore, they produced backlash in the shutter, with intermittent streaks flaring across the screen when the machine was cranked unevenly.

Simplex's Approach to Problem

Simplex attacked the problem in a different manner by revolving the entire movement. The problem was where to locate the axis of the revolving movement. The first thought would be the camshaft, because the camshaft gear must turn in a fixed position; the bearings must remain in one position so the center-to-center distance of this gear and the

By A. C. SCHROEDER

III. Conclusion

mating gear remains constant. However, the intermittent shaft would then swing in a circle around the camshaft, also carrying the intermittent sprocket around in a circle and causing complications at the front plate where the film was pulled down.

Revolving the movement about the intermittent shaft as a center kept the sprocket in the same position relative to the front plate and the aperture, but this caused the camshaft to move in a circular path, carrying its gear with it. To drive this "movable" gear it was necessary to have another gear whose center coincided with the intermittent shaft, thus allowing the driven gear to roll around the driving gear as the picture was framed, without changing the mesh of the gears in the least.

Suppose that we hold the flywheel while the framer is moved. Then the intermittent case revolves and carries the camshaft and its gear in a circular path, causing the camshaft gear to roll around the central gear. The central gear cannot turn because it is on the flywheel shaft, which we are holding. Thus, by framing the picture the driven gear and the cam

have been turned through a partial revolution. What we have done, in effect, is to hold the shutter stationary and turn the cam through a certain angle, thus throwing the shutter out of time.

This has been provided for, however. Around the intermittent case is a ring with a cam, and, by means of a plunger and a lever, the cam slides a spiral gear along its shaft. This gear is in mesh with a somewhat similar gear. As we move the framer, while holding the flywheel, this spiral gear slides along its shaft and causes the mating gear to revolve, which in turn revolves the shutter, thus keeping it in time.

Film Transfer Power Action

The movement requires considerable power during the film transfer; but very little power is needed at other times. Power is needed to pull down the film against the resistance of the tension shoes, and to start and accelerate the parts. The machine runs quite free while the film is stationary, and when the load is suddenly applied in order to move down the next frame, it imparts a severe jar to the gears, bearings, *etc.* To overcome this a flywheel which has a comparatively large momentum is used to drive the cam while the film is moving.

This was quite apparent when the machines were cranked. When cranking very slowly we felt a greater resistance as each frame was pulled down. On speeding up a trifle the uneven resistance was less noticeable, and as the speed increased further the uneven resistance disappeared completely: enough energy had been stored in the flywheel so that

NOTE: Data anent the Simplex projector given in the accompanying article refer to models prior to the X-L mechanism, recently introduced.

it could drive the movement, while one frame was pulled down, without additional power from the crank.

The location of the flywheel is important. If it is placed on the shutter shaft, for instance, all the gears, pins, and other parts between the shutter and the cam are subjected to the uneven torque. This causes undue wear on these parts and occasions considerable noise. The flywheel should be right on the camshaft; but this is inconvenient on the Simplex, so it is placed on the shaft which drives the camshaft. The uneven torque is thus transmitted through only two more gears.

Simplex Working Parts

Figure 16 shows the working parts in the Simplex movement. In the upper right corner is the flywheel shaft. In the intermittent case this shaft is in line with the intermittent shaft, the two gears are in mesh and the cam contacts the star. The longitudinal groove in the flywheel shaft is for oil distribution. The shaft runs in a long bearing, and portions of it may starve unless oil is distributed throughout the entire bearing.

End-play is adjusted at the flywheel. After loosening the lock screw, the knurled knob is held and the shaft is turned with a screwdriver until a *just perceptible* endwise movement of the shaft is present. With *no* end-play, there is danger of the shaft tightening up. Too much end-play results in clatter. Be sure to tighten the lock screw again.

Eliminating Travel-Ghost

Projectionists sometimes notice travel-ghost after making this adjustment, but fail to connect the two. When the adjustment is made the knurled knob is held, which also holds the shutter stationary. The flywheel shaft is then turned with a screwdriver, thus turning the gears and the cam in the intermittent case. Note that the shutter is stationary while the cam is turned—which amounts to holding the cam and moving the shutter.

Immediately below the flywheel shaft is the camshaft. To adjust end-play loosen the lock screw, or screws (on some movements this requires removal of the flywheel). Then the flywheel (or

the flywheel shaft, if the flywheel has been removed) is held while the nut on the camshaft is turned until the end-play is correct.

In all cases the end-play should be tested again *after* tightening the lock screw. This holds true for many other adjustments about the mechanism. Locking the adjustment may throw it off, in which case it must be done over.

Post-Adjustment Procedure

After adjusting end-play in either shaft the movement must turn perfectly free, if it has seen considerable service. On a new movement the bearings will bind enough so that this cannot be taken as a criterion, making attainment of proper end-play more difficult. In either event, the test should be made with the star in the locked position, because the pin may fit snugly in the star, or the intermittent shaft bearings may add a little drag, which throws one off.

To adjust star-and-cam relationship the movement is turned so that the cam is directly under the star. The screws on the cover are then loosened and the weight of the cover and the parts carried by it forces the star down against the cam. Only a thin film of oil will then separate them. Tighten the screws again, and the job is done.

Sprocket Change Procedure

Next, in Fig. 16, we have the intermittent shaft with the star on the right end, and immediately to the left is a spiral groove, which also controls the oil; but this one keeps the oil from flowing to the right and out of the bearing, preventing loss of oil and a messy machine. The groove acts like a thread to

The taper pins are forced in under considerable pressure, requiring strenuous effort to remove them. Unless certain precautions are taken, this pressure is enough to spring the shaft or damage the sprocket.

A device is available to remove and to replace these pins with little chance of trouble. Lacking such a device, the shaft and sprocket are placed on some support so that the metal immediately surrounding the pin rests on it. If this be a block of hard wood, no hole is needed for the pin as it is driven through. However, if a metal support be used, a small hole must be drilled in it so the pin can fall out of the sprocket.

A hammer and punch are used to remove the pin, placing the punch on the *small* end of the pin. The punch must not be much smaller than the pin, otherwise it will bury itself and expand the pin, wedging it in the hole tighter than ever.

Adjustment of New Sprocket

After removal of the pins the sprocket is slid off. The new sprocket should slide on easily. The holes in the sprocket are also tapered, and the large hole must be adjacent to the large end of the hole in the shaft. After the holes in the shaft and the sprocket are aligned, place the small end of the pin into the large end of the hole. Drive it in securely, but do not use extremely heavy hammer blows. The support must again be used under the central portion of the sprocket. Cut off the projecting portions of the pins flush with the sprocket.

The shallow groove at the left end of the intermittent shaft is for the set screws holding the collar. This collar determines the end-play. After loosening the screws the sprocket and shaft are pulled firmly away from the machine, the collar is set up close against the bearing, and the set screws tightened.

Do not pull too hard, as the sprocket is light and might bend. If the collar has been set up a trifle snug, loosen the set screws slightly, not enough so that they are completely free. Now tap the end of the shaft lightly until it just turns freely; then tighten the screws. Check the adjustment again after tightening the screws.

The holes in the ends of the sprocket are to lighten it as much as possible and yet retain the required strength and rigidity. Remember that the sprocket and the shaft are started and stopped 24 times a second, and that the heavier the parts the harder it is to do this, throwing more strain on the rest of the machine and on these parts, too.

Inside the intermittent case is an oil deflector which scoops up oil that is thrown by the star wheel and directs it into the holes to lubricate the bearings. It is a sort of circulating system: oil is

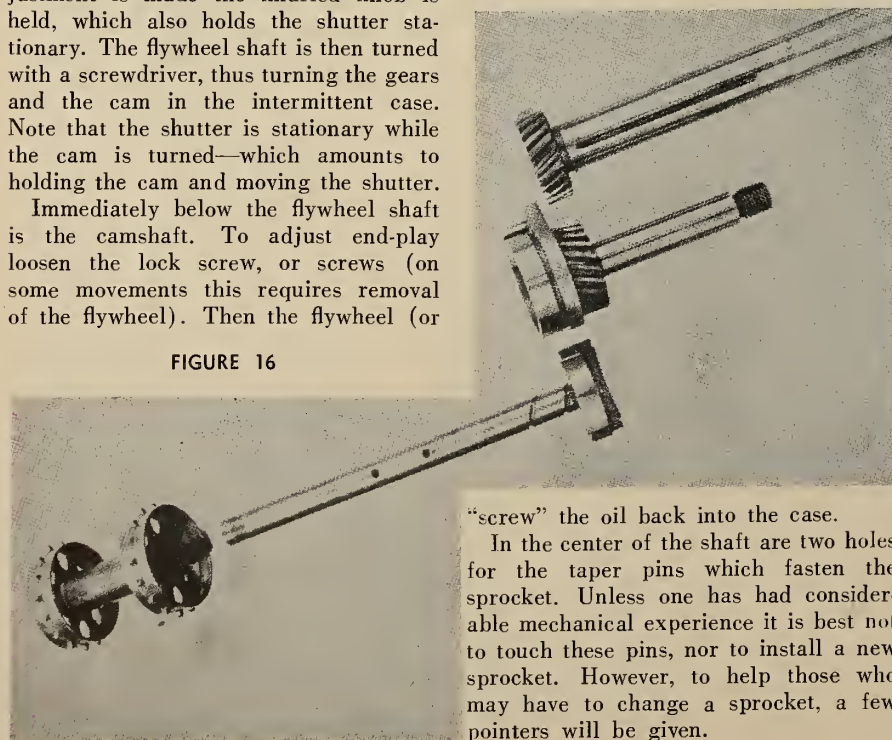
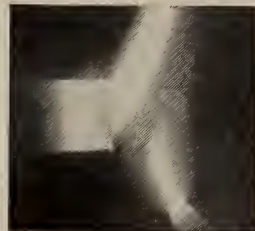


FIGURE 16

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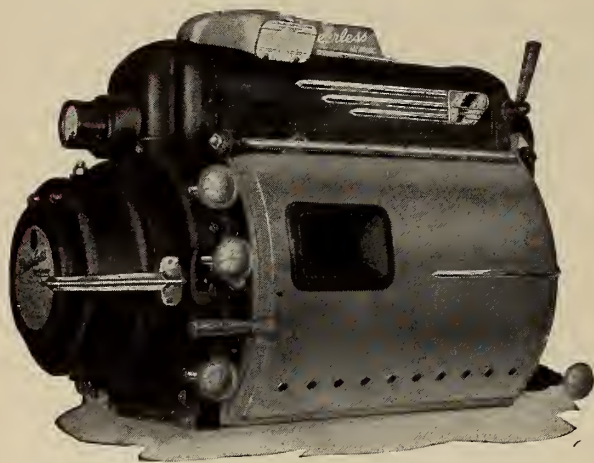
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constantly draining into the bearings and they are kept practically flooded.

The Motograph Movement

Figure 17 shows the parts of the Motograph movement. On the left is the cam and its shaft. On the left end is a flat spot against which the flywheel lock screw seats. There is another similar flat directly opposite, for the second lock screw. On the right end of the shaft is the cam ring and the pin. Immediately to the left of the cam ring is a heavy disc, which supports the cam ring and also acts somewhat as a flywheel.

Just to the left of this disc is the spiral oil groove. The first impression might be that this is two diagonal grooves or slots, but actually it winds around the shaft and is one continuous groove.

Above and to the right is the star and its shaft. This looks very similar to the Simplex star, but close inspection reveals that the back of the slot is closed by a web, which supports the points of the star just where support is needed most.

Here we have another oil groove, but this is sort of a double affair. A short groove, hardly discernible in the picture, tends to send oil from the star end of the bearing into the center. The other groove, which is about twice as long, returns the oil, keeping it from oozing out of the other end of the bearing. The two holes, of course, are for the taper pins.

The cam and star operate in a housing containing a semi-solid grease. In action the parts in the chamber churn the grease and, because of the design of the chamber, so keep the grease in motion that it is continually being forced over and around the parts it is to lubricate.

The flywheel, as indicated previously, is mounted directly on the cam shaft. To adjust end-play, two small screws in the face of the flywheel near the outer edge are first loosened. These screws lock the set screws which fasten the wheel to the shaft. The actual locking screws are two long screws, the heads of which are set in the periphery of the flywheel. After loosening these, the flywheel is pushed inward while pulling out on the knurled retaining screw on the end of the cam shaft, thus removing whatever end-play exists. The two long screws are tightened first; then the two small screws.

A steel ball is situated at the right end

FIGURE 17



Projectionist Examination Questions

Based on Examinations by Leading U. S. Municipalities

41. The phenomenon which permits a gas to become a conductor of electricity is called _____.
42. The draft in the vent pipe which ventilates the projection room shall be maintained by an exhaust fan having a capacity of at least _____ per minute.
43. By decreasing the resistance of the field rheostat connected in the shunt field circuit of the generator which supplies current for the arc, you _____ the terminal voltage of the generator.
44. Slow-burning film is also called _____ film.
45. The motor of the exhaust fan which ventilates the projection room shall be connected to the _____ service.
46. The potentiometer used by projectionists to control the level of the sound is called _____.
47. Those frequencies of vibration which can be heard by the normal human ear are called _____.
48. The "negative terminal" of any electrical device is called the _____.
49. The switch that controls the projection room exhaust fan shall not be located in _____.
50. Draw a diagram of a meter having a shunt, placing them in some circuit used in the projection room.
51. If you were forced by circumstances to use a-c at the arc, which carbon would be positive?
52. Name some of the causes that prevent contact of brushes with the commutator.
53. Name some reasons for fires in the projector.
54. What are the results of large film loops?
55. Describe briefly the "split-aperture" method of comparing lenses.
56. What precaution is necessary on the E-7 Simplex when forming upper loops?
57. If an up-and-down "travel-ghost" appeared on the screen and you found that it was caused by the master blade of the shutter not being wide enough, and it was the only shutter you had, what would you do to correct the condition?
58. What simple alteration would you make to a projector to eliminate keystone effect of the picture on the screen?
59. What trouble ensues when bits of melted copper coating from the carbons get under the positive carbon carriage on the Peerless Mag-narc lamp?
60. Two motor generator sets are used to supply current to the arcs. The generators are wired for parallel operation. For some reason or other, one of the generators has had its polarity reversed. Explain how the polarity of this generator should be corrected.

of the intermittent shaft. Beyond this ball is a short plunger which is locked in position by a set screw. To adjust end-play in the intermittent shaft, loosen the set screw, push in on the plunger (not too hard) and tighten the set screw.

The star wheel shaft turns in an eccentric bushing which is part of a bracket that also carries the outer bearing. While this shaft has two bearings and is adjusted by an eccentric, it is a far different arrangement from that used on projectors years ago. Both bearings are carried in this bracket, and they cannot get out of line. There is only one eccentric, not two as formerly. When adjusting the eccentric the bracket swings in a circle, carrying the bearings with it and maintaining positive alignment.

Star and Cam Relationship

To adjust for star-and-cam relationship, the set screw near the inner bearing is first loosened; then, by means of the two screws which operate against the projection on the bearing bracket, a micrometer adjustment can be obtained

by backing off one screw and tightening the other.

The position of the bearing bracket can be adjusted *exactly* as wanted: there is no hit-or-miss procedure as formerly, such as putting a punch into a hole in the eccentric and giving it a haphazard pull.

Care must be exercised during the adjustment so that the star is not forced against the cam too tightly. Terrific force can be applied to these parts when turning the adjusting screw. While slowly turning the screw with a screwdriver in one hand, turn the flywheel back and forth with the other hand, but only a small amount, so that the cam ring is always in contact with the curved sides of the star.

Tightening of the screw must stop the instant that the slightest drag is felt on the flywheel. Back off the adjustment *slightly* so that this drag is completely removed. Now see that the bearing bracket is inward as far as it will go, after which tighten the first-mentioned set screw.

BECAUSE of my known keep interest in improved safety measures, a friend of mine was kind enough to forward to me a copy of your October, 1948, issue in which appeared (page 12) the article "Fire Extinguishers in Projection Rooms," a joint contribution by George R. Stewart and Robert A. Mitchell. After reading this article, I just could not resist the impulse to contribute the following data, in the hope that it will aid those men who are exposed to various forms of noxious gases.

The aforementioned article was based on a report by the Civil Aeronautics Board relative to the crash of a 4-engine aircraft just outside Mount Carmel, Penna., on June 17, 1948, which claimed the lives of all 43 persons aboard.

It would seem that the IP article is based on misinformation as to the seriousness of the effects of given concentrations of CO₂ (carbon dioxide) on human beings; and Mr. Mitchell inclines to the view that the existence of smoke was more serious than the concentration of CO₂ in the cockpit.

No Evidence of Fire, Smoke

Following investigation of this plane crash by the Air Line Pilots Association, samples of various portions of the cockpit were sent to the Chemical Division of the Federal Bureau of Investigation for test and analysis. The FBI report stated that there was no discernible evidence of smoke or fire in the cockpit; and it continued:

"There was no sign of fire in the cabin prior to impact. Likewise, there was much cabin material which showed no sign of smoke at all. The only fire damage to cabin furnishings was of such nature as to be confined to ground fire only"—that is, after impact.

According to the La Guardia Airport (New York) log report, the captain of the ill-fated plane stated definitely in a radio message during his emergency descent: "We've released fire extinguisher (CO₂) in forward baggage pit."

This message indicates definitely that there actually was no fire prior to impact but rather that there was a *false indication* of such, in which case the flight crew, acting in their best judgment from available knowledge, discharged the CO₂ system without first providing cockpit ventilation. As a result, the cockpit air apparently became contaminated with carbon dioxide to a sufficient concentration as to cause the crew to become unconscious.

Relative to Mr. Mitchell's statement that the manner of incapacitation of the flight crew does not suggest the effects of CO₂ at all, I should like to quote from tests relative to CO₂ discharges made by an airline in the forward cargo compartment of a 4-engine aircraft:

Addendum:

CO₂ Fire

Extinguishers

The writer of the appended contribution recently retired as a commercial airline pilot of long and varied experience to engage in the purely engineering aspects of aviation, with particular regard to improved safety measures. Employer rules make it necessary that he not be identified.

6:06 P. M.—We took an air sample of the cockpit, which was in a supercharged condition at 15,000 feet. The left-hand auxiliary vent control was then placed in the $\frac{1}{8}$ open position (tail gates open). Immediately thereafter both cabin superchargers were dumped, and the cabin and galley recirculating fans were shut off.

6:07 P. M.—The first set of CO₂ bottles was pulled and immediately thereafter a 2,000-feet-per-minute descent was started. Almost immediately after starting the descent, the First Officer asked permission to put on his oxygen mask; permission was granted. The First Officer was observed to put on his mask, which had previously been connected to the oxygen valve set at 25,000 feet.

6:08½ P. M.—The second and third sets of CO₂ bottles were pulled, altitude approximately 12,000 feet, and almost immediately thereafter the First Officer appeared to be in great distress. He removed his oxygen mask and requested the Captain to do something "quick."

6:09 P. M.—Captain requested both auxiliary vents wide open; Flight Engineer complied. At this time the Captain's eyes began to smart and he began to get groggy. At the same time the First Officer passed out.

6:11 P. M.—The cabin flight crew opened two emergency exit windows, upon Captain's request, and started forward to advise Captain of compliance. At this point, Captain was having difficulty maintaining concentration on flight instruments.

6:13 P. M.—Captain was very groggy but managed to open cockpit window.

He recovered with the aid of fresh air. 6:14 P. M.—First Officer recovered.

6:26 P. M.—Landed airplane.

As for myself, I recall difficult breathing followed by dizziness after the third CO₂ bottle was pulled. I started for oxygen, but hadn't realized how badly off I was and didn't quite make it. I passed out completely and was pulled to the forward cabin compartment by the cabin crew. I recovered after the cockpit and the cabin windows were opened.

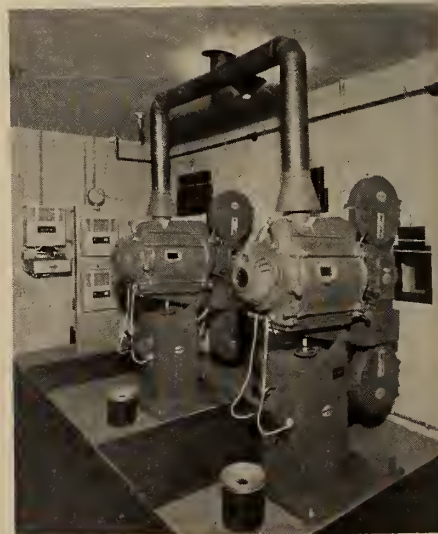
I can say from experience that there is no warning when breathing excessive concentrations of CO₂, and when you realize that you're in distress you have lost all muscle coordination. In other words, you know what you want to do but you can't do it. I knew that I was passing out and tried hard to do something about it, but I couldn't move.

Bearing out our own experience is the following medical report issued by a noted clinic which has done extensive research work on the problem of the effects of CO₂ on human beings:

Symptoms of CO₂ Intoxication and the Order in Which They Occur

- a. Increase in rate of breathing.
- b. Unbearable difficulty in breathing.
- c. Depressed or inhibited respiration.
- d. Smarting of eyes.
- e. Unusual taste and smell sensations.
- f. Dizziness.
- g. Muscular weakness and incoordination.
- h. Disorientation.
- i. Lack of judgment.
- j. Headache.
- k. Vomiting.
- l. Pallor.
- m. Convulsions.
- n. Shock.
- o. Collapse.
- p. Cardiac (heart) failure.
- q. Other symptoms of anoxia.
- r. Death.

The same clinic also states that carbon



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dioxide gas is toxic to humans because it produces anoxia, a gaseous acidosis of the blood which will produce failure of a normal healthy heart. The maximum allowable CO₂ concentration for habitated compartments at sea level is 5 volumes per cent for 5 minutes.

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On our first test flight one set of bottles (30 pounds of CO₂) was pulled and a 12 per cent concentration of CO₂ remained in the cockpit for 10 minutes and subsided slightly thereafter. Carbon dioxide being much heavier than air, it seeks the lowest level, which during the descent of most planes happens to be the cockpit. This accounts for the flight crew having greater difficulty than the cabin crew.

Mr. Mitchell is of the opinion that the mere 10 minutes between the time the CO₂ was released and the crackup of the airplane was not sufficient for the production of an asphyxiating concentration of CO₂ and the subsequent incapacitation of the crew. I believe that our personal experience and the clinical report aforementioned is in direct opposition to this opinion.

It is also stated by Mr. Mitchell that because carbon dioxide is heavier than air it does not diffuse upward. This is true; but on this point I think that Mr. Mitchell probably forgot that the cockpit is the lowest point of most places during descent.

Circumstances Alter Odds

In Mr. Mitchell's closing paragraphs he states that humans breathe large quantities of carbon dioxide; but here it would seem that he is talking in terms of 0.03 per cent and not in terms of a range of from 3 to 12 per cent such as exists in the cockpit of a plane when CO₂ is discharged into the cargo compartment.

Discussions of this sort are most interesting and often valuable to any group which is in close proximity to such chemicals; and I hope that the foregoing notes serve a useful purpose for the members of your particular craft.

Kodak Offers 2000 Photo Patents

Eastman Kodak Co. has placed upon the U. S. Patent Office Register for publication in the Official Gazette a group of about 2,000 photographic patents which the company is offering to U. S. applicants for non-exclusive license upon reasonable terms. Said a Kodak official:

"While the owner of a patent is entitled to 17 years of exclusive use of his invention, Kodak has believed for some time that after a reasonable period to work on the development of a photographic invention, it is in the interest of the broader development of photography to offer licenses under the patent to others in the U. S. on a fair basis."

Heating of Film by High-Intensity Arcs

By HUGH MCG. ROSS

SECOND AND FINAL ARTICLE ON MEANS OF REDUCING THE HEAT PRODUCED BY HIGH-INTENSITY ARCS, AS PRESENTED TO THE BRITISH KINEMATOGRAPH SOCIETY.

BECAUSE overheating of the film damages the base rather than the emulsion, by causing "embossing" of the picture area, it is necessary to consider more precisely what happens to the base, and particularly the part of the base next to the emulsion, which has already been shown to be the part which will be first damaged.

Figure 3 shows the temperature of the emulsion-side of the base during the exposing cycle. In a theater projector the temperature rises rapidly at first as the light comes on to the particular frame considered, and then falls somewhat as the flicker-blade obscures the light—the heat is spreading deeper into the base. During the second exposing period the temperature again rises; in the figure this part of the curve is to some extent estimated.

After exposure is completed the heat now in the film (and mainly concentrated in the first thousandth of an inch of the base) spreads throughout the thickness of the base. This spreading is virtually completed about four frames after the gate (*i. e.*, 4/24 of a second later) when the whole film is at about one-fifth of the maximum temperature previously reached. The whole film then very gradually cools down to room temperature after being wound up on the take-up spool.

The rise of temperature of film in a process projector is also shown in Fig. 3. There is no flicker blade, and a 200° angle of shutter opening has been assumed.

Further results arising from the theory are that it makes little difference whether the light falls on the emulsion-side or the base-side of the film; the absorption of radiation by the base material is negligible compared with the absorption by the silver; it makes little difference whether the silver is distributed uniformly through the emulsion layer or concentrated to some extent near the surface; at the end of the exposing period about one-eighth of the heat is in the emulsion and the remainder in the base. The average density of the print makes little difference—only practically full whites are significantly cooler.

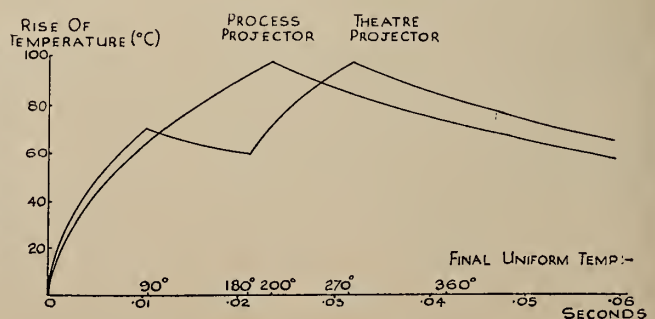
Light Output from Projector

The rise of temperature of the film-base to the intensity of heating of the film in the gate may conveniently be expressed in watts per sq. cm. If we know the luminous efficiency of the radiation of a particular projector, it is possible to relate the rise of temperature to the total light passing through the gate. The total light reaching the screen will be slightly less, due to the light-loss in the objective lens.

Figure 3 has been drawn for a temperature rise of 100° C. above room temperature. This is only an assumed maximum value, but it is of interest to note that this corresponds to a light flux at the gate of about 9,500 lumens in the case of a theater projector. (With shutter running, intensity of radiant energy at gate 62 watts per sq. cm.; un-

(Continued on page 27)

FIG. 3. The heating cycle of film while in the projector gate. The rise of temperature is calculated for the emulsion side of the base. The maximum value reached depends on the light output.



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Nat'l Theatre Sup. Co.
FORTY FORT
V. M. Tate Theatre Supplies
GREENSBORO
Standard Theatre Sup. Co.
HOUSTON
Southwestern Theatre Equip. Co.
INDIANAPOLIS
Nat'l Theatre Sup. Co.
KANSAS CITY
Shreve Theatre Supply
Nat'l Theatre Sup. Co.
LOS ANGELES
J. M. Boyd
C. J. Holzmüller
Nat'l Theatre Sup. Co.
Projection Equip. & Main. Co.
LOUISVILLE
Falls City Theatre Equip. Co.
MEMPHIS
Nat'l Theatre Sup. Co.
MILWAUKEE
Nat'l Theatre Sup. Co.
R. Smith Co.
MINNEAPOLIS
Minneapolis Theatre Supply
Nat'l Theatre Sup. Co.
NEW HAVEN
Nat'l Theatre Sup. Co.
NEW ORLEANS
Nat'l Theatre Sup. Co.
NEW YORK CITY
Nat'l Theatre Sup. Co.
NORFOLK
Nat'l Theatre Sup. Co.
OKLAHOMA CITY
Nat'l Theatre Sup. Co.
Oklahoma Theatre Sup. Co.
PHILADELPHIA
Blumberg Bros.
Nat'l Theatre Sup. Co.
PITTSBURGH
Atlas Theatre Supply
Nat'l Theatre Sup. Co.
SALT LAKE CITY
Inter-Mountain Theatre Sup. Co.
SAN FRANCISCO
C. J. Holzmüller
Nat'l Theatre Sup. Co.
W. G. Preddy Theatre Sup.
SEATTLE
B. F. Shearer Co.
Nat'l Theatre Sup. Co.
SIOUX FALLS
American Theatre Sup. Co.
ST. LOUIS
City Electric Co.
Nat'l Theatre Sup. Co.
TOLEDO
Theatre Equip. Co.
WESTERLY
G. H. Payne Motion Picture Service
CANADA
Dominion Sound Equip. Ltd.
Montreal, Quebec
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Silvered glass reflector and two-element variable focal length lens system.

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Notes on Modern Projector Design

By ROBERT A. MITCHELL

THE operative function of a motion picture projector mechanism—the “head”—is exactly the same today as it was in the days of the Lumières, Paul, Armat, and Messter. The essential parts are few in number. There must be a gate to hold the film flat during exposure, a device to pull the film through the gate intermittently, a rotating shutter to occult the picture during each pull-down of the film, and a firm support for the objective lens.

The foregoing paragraph would be entirely wrong had projectors of the “continuous,” or optical, type proved successful, or had electronic scanning of the film pictures been adopted when the principles of television were first known. But no such radical innovations as these have intruded into commercial theatre projection. Except for the addition of sound reproduction, motion picture machines employ the same operational principles that permitted Pauline to be imperilled weekly in the old-time nickelodeons.

Other parts besides the “essentials” are absolutely necessary, however, to facilitate the working of the basic parts—feed and takeup sprockets to assist the intermittent, drive-gearing to make the machine operative, a framer to insure proper registration of the picture in the aperture at all times, a “timer” for the shutter, a lens-focusing adjustment, *etc.*

But beyond these two categories of parts, all else which is incorporated into the mechanism is accessory, however important it may be. Automatic fire-shutters, threading lamps, cooling devices, and various other gadgets to make operation and maintenance easier and safer are necessary even though secondary to the functional requirements of the projector. All considered, though, a projec-

tion head need not be unduly complicated, nor need any of its parts be difficult of access. Simplification, not complication, is the keynote of modern projector design.

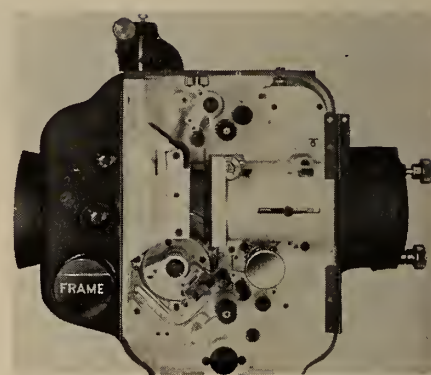
Outmoded Features Retained

The unwieldiness and flim-flam apparent in certain projectors originated in attempts to both impress (?) prospective purchasers by an appearance of innovation and in a reluctance to abandon primitive standards. In the latter case, really new features are bent, as it were, to fit in with retained obsolescent features. The potential advantages of the new are squelched by the old.

The ungainly projector bases and drive systems which appeared with the advent of sound pictures furnish an illustration of an over-conscientious engineering which defeats its own purpose. Innumerable “attachments” and “adapters” intended to provide antique visual and sound units with a note of modernization clutter tens of thousands of projection rooms the world around.

The stubborn persistence of separate picture and sound heads is one of the strangest of the motion picture industry’s many anachronisms. To date, very few projector manufacturers have dared defy this inexplicable conservatism. Films are no longer run “straight silent” in theatres, so why must separate sound “attachments” and silent heads be used instead of unified sound-and-picture mechanisms?

The requirements of the sound reproducer are well defined; and these requirements are the same for theatres of all sizes and classes. Large theatres naturally need more powerful amplifiers and larger speaker installations than the smaller theatres, but the function of the sound “head” is the same in all cases.



Motiograph projector viewed from the operating side with the film gate open.

“Wows” and “fuzzy” sound reproduction are as bad in a little neighborhood house as in a palatial “superdreadnaught.”

Visual-Sound Hybridity

It is disconcerting to see in so many projection rooms the latest models of Simplex, Brenkert, Century, Motiograph, and other fine mechanisms mounted on sound heads of ancient vintage. Failure to bring the sound head up-to-date with the picture head converts the projector into a hybrid which can never be completely satisfactory to the projectionist, and which requires rather frequent servicing to keep the sound reproduction up to a level of quality consistent with the screen image.

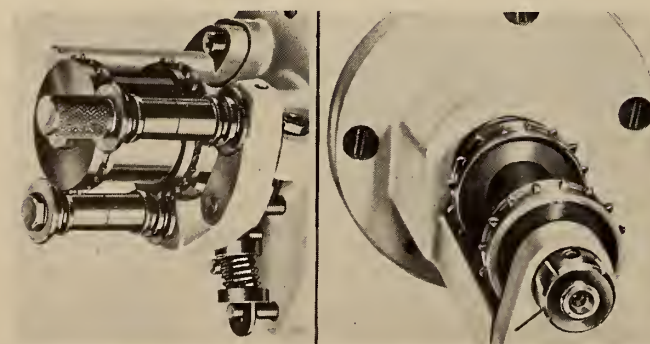
We wonder if any exhibitor would tolerate an Edison Kinetoscope or a Powers Cameragraph mechanism on a brand-new RCA or Western Electric sound head!

We take the liberty of propounding a sincere question to the International Projector Corp. and to Brenkert, each a manufacturer of quality projection equipment. Why, gentlemen, have you seen fit to design your latest motion picture mechanisms as straight silent machines, without incorporating into their construction the sound-reproducing device which all purchasers must use with them?

Both DeVry and Weber Syncrofilm have amalgamated picture and sound mechanisms into one compact unit, saving space, weight, parts, a great deal of maintenance time and trouble, and insuring permanent alignment of gear trains and the film path.

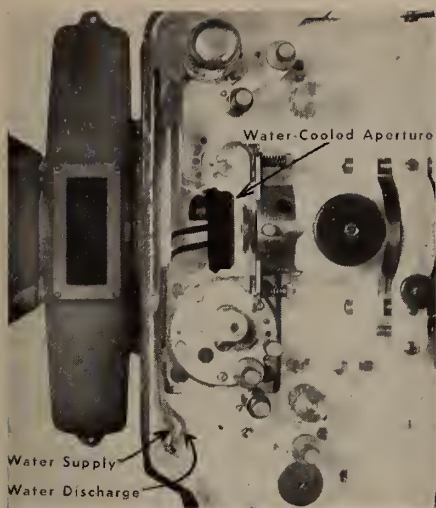
In this connection, we also wonder why the maker of the British Walturdaw V did not adopt the Ernemann VII-B as a prototype, instead of the Ernemann V. The VII-B is a *complete* sound-and-picture mechanism which is a neat unit in spite of the fact that the usual optical

TWO IMPORTANT FEATURES OF THE NEW SIMPLEX X-L PROJECTOR MECHANISM



Upper and lower sprockets (left) have 24 teeth, 8 more than usual. Operating at 240 rpm, a reduction in speed of 33-1/3%, they reduce load and wear on all components. Greater radius affords a wider bend, a better wrap of film, minimizes patches pulling apart and eases transit of damaged film. Intermittent (right) designed to eliminate in-

termediate gearing and reduce wear. White markings and painter at fore end, the frame lock indicator, give instant visible evidence of positive lock between star and cam for accurate framing.



Century Model CC projector (light shield removed) showing water-cooled aperture hook-up, water supply, and discharge pipes.

tube is used in the sound reproducer instead of a cylindrical lens. We hesitate to cite the B.T.H. SUPA as an example of unit construction, however, since compared with the DeVry and the German Ernemann VII-B it is rather "sprawly" and primitive in design.

If imitation is really the sincerest form of flattery, several projector manufacturers will be justified in assuming airs of vast superiority. In America the basic construction of the Simplex "Regular" has engendered a multitudinous and assorted progeny; and on the other side of the Atlantic we award a similar distinction to the German Ernemann, the father of the British Walturdaw, the Swedish Aga-Baltic, the Italian Mikroteknika, and innumerable direct "steals" in the land of technological plagiarism behind the Iron Curtain.*

'All Is Not Gold ...'

Considering a slavish imitation of obsolescent models as one extreme in the world of projector designing, the ambitious fabrication of super-duper, jet-propelled, juke-box monstrosities is certainly the other. Streamlining looks mighty queer in an apparatus no more locomotive than a theatre projector; and a look-see at the works usually reveals that the exterior surrealism has a remarkable tendency to penetrate into the design of the interior. The most wild-eyed examples of this sort of thing are found in Eng-

* It is doubtful that Russian copies of Ernemann projectors are being made in the Zeiss works in Soviet-occupied Germany. In fact, it is doubtful that anything even remotely resembling a motion picture machine is being made there. Russian "dismantling" operations included indiscriminate destruction of valuable machine tools. Female Russian "soldiers" had a field day throwing precision instruments out of the factory windows.

land, where projector designing appears to be torn between two loves—American and German, design—and occasionally flies off on a mad tangent.

The use of 16-tooth feed and holdback sprockets in most American mechanisms is undoubtedly due to the inherently conservative nature of American designers; but this particular clinging to the customs of our forefathers is not so great an evil as many European technologists would have it. This topic has been raised to the forefront in projection room bull sessions because of the adoption of 24-tooth upper and lower sprockets in the new Simplex X-L mechanism.

Sprocket Film Wrap

In Europe 32-tooth upper and lower sprockets have always been standard. As used in the Ernemann, the Bauer, and the Euro, the 32-tooth sprocket is hazardous because only one pad roller is employed at each sprocket. In order to minimize the risk of "sprocketing" (film jumping off the sprocket) two pad rollers must be used on large-size sprockets. The film-carrying conditions at the lower sprocket are especially unstable due to the fact that the film engages this sprocket directly from the lower film-loop, the irregular motion of which tends to throw the film off the sprocket. Unless two properly spaced pad rollers are used, the passage of torn perforations or a buckled film splice may be sufficient to cause the film to "climb" the sprocket teeth.

In the opinion of the writer, any "wrap" of film around a sprocket exceed-

ing $\frac{1}{4}$ the circumference of a 16-tooth sprocket, or $\frac{3}{16}$ the circumference of a 24-tooth sprocket, or $\frac{1}{8}$ that of a 32-tooth sprocket, invites trouble in the form of noisy operation and possible perforation damage when badly shrunken film is projected. But most prints currently in circulation, however damaged they may become in other ways, have a low shrinkage characteristic. This is especially true of prints on the new triacetate stock. So perhaps we are justified in considering the aforementioned specifications too exacting.

The following more generous figures indicate a fair value for the "maximum film wrap" around sprockets of different sizes when only *slightly shrunken* film is used:

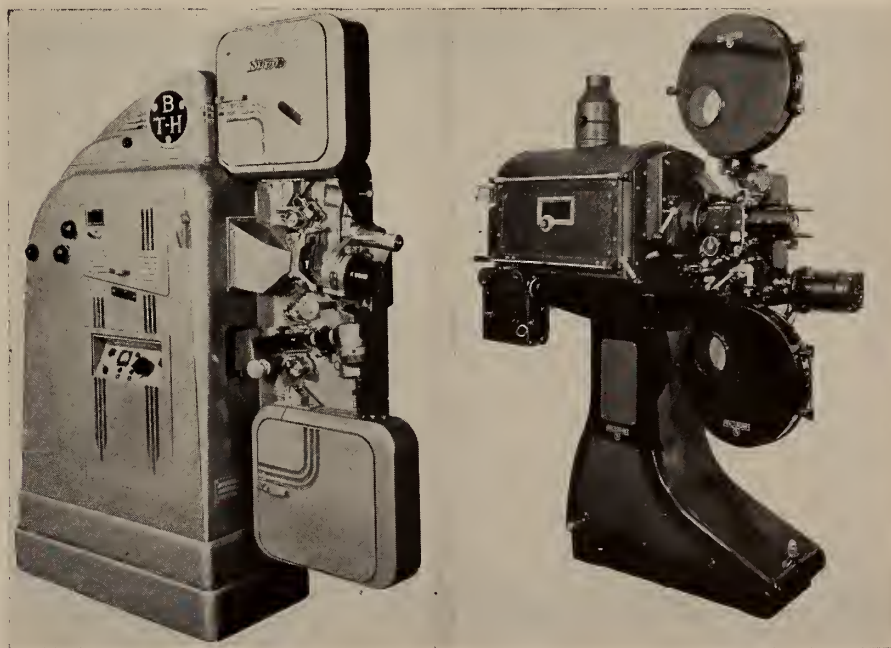
16-tooth, $\frac{1}{2}$ the circumference.

24-tooth, $\frac{3}{8}$ the circumference.

32-tooth, $\frac{1}{4}$ the circumference.

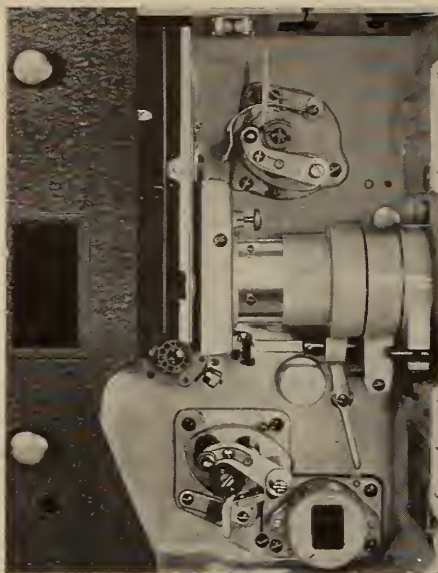
The upper 32-tooth sprocket of the Ernemann has a film wrap of approximately $\frac{3}{8}$ of the circumference of the sprocket (too much), and the lower 32-tooth sprocket about $\frac{1}{4}$ the circumference. The Euro has a film-path similar to that of the Ernemann. Both the upper and lower 32-tooth sprockets of the Bauer have a film wrap of about $\frac{3}{8}$ of the circumference (too much).

The chief advantage claimed for large feed and holdback sprockets is decreased film wear and an increase in the life of the sprocket-shaft bearings (because the larger sprockets revolve more slowly). A European motion picture engineer offers



Over-all view of the 'streamlined' B.T.H. Supa which combines in one enclosure all visual and sound projection units. Note control panel at side, regarded by some projectionists as inviting errors in operation.

Reminiscent of the Ernemann (German) projector is the Walturdaw V unit of typical European open-type design, with water-cooled film trap and 8-frame upper and lower sprockets. One of the basic designs.



Operating side of Brenkert BX 60 projector, showing film path. Roomy operating compartment affords ample 'finger-room' for threading, cleaning and maintenance.

the following views anent lessened film damage with the large-size sprockets:

16- vs. 32-Tooth Sprockets

"With regard to 16- *contra* 32-tooth sprockets, it is my experience that the 16-tooth size is better for shrunken film; but we have also learned that the larger size is better and prevents damage if the film perforations are weak. In addition to the 600-meter (2000-foot) reels, we also use 1500-meter (5000-foot) and 1800-meter (6000-foot) reels; and when such are used, we prefer 32-tooth sprockets."

In the Simplex X-L mechanism, 24-tooth feed and takeup sprockets are used, this size apparently being considered a happy medium and a departure not too radical to offend a native conservatism. Even though the 24-tooth sprocket is less than the whole hog, Simplex has handled it nicely. The film wrap is satisfactory, and double pad rollers are used on both upper and lower sprockets.

We refer to Sherlock Holmes the mystery of G. B. Kalee's recent switch from 24- to 16-tooth sprockets. Cynics interpret the change as a bid for American trade.

Larger Intermittent Movement

The W. E. Mirrophonic sound head employs a 32-tooth sprocket together with a novel film path which permits the large sprocket to function both as a sound sprocket and as a holdback sprocket.

The B.T.H. SUPA (and the Mark II, which is the SUPA without the "Body by Fisher") displays unprecedented variety in the choice of a 24-tooth upper sprocket, a 16-tooth intermittent, and a 32-tooth lower sprocket. Confoosin' but not amooosin'.

Belated though the adoption of large-

Tv Topics Take Precedence at SMPTE 67th Convention

VIRTUALLY every aspect of television engineering, and a smattering of motion picture topics, were represented by technical papers anent the latest developments in equipment and technique presented at the recent 67th convention of the Society of Motion Picture and Television Engineers, at the Hotel Drake, Chicago, April 24-28, inclusive. The papers program for this meeting constituted ample justification for the recent change in the Society's name by the addition of the word "Television."

Three full sessions were devoted exclusively to reports and discussion on the swift-paced progress of Tv development, with considerable emphasis upon the outlook for color Tv. Film projection, theater sound equipment and technique, and 16-mm equipment were accorded relatively minor attention during the convention—a tendency which has become more pronounced during the last three meetings of the Society.

A "gratifying unity of interest" between the motion picture and Tv fields was noted by SMPTE President Earl Sponable, but there can be not the slightest doubt that purely motion picture topics are, and have been for the past two years, relegated to a subordinate position on the list of Society interests. This is amply proven by the appended selected abstracts of papers given at the meeting.

The next, 68th, convention will be held at Lake Placid, N. Y., on October 16-20, inclusive. The abstracts follow:

A HEAVY-DUTY 16-MM PROJECTOR

Edwin C. Fritts

Eastman Kodak Company

An intermittent sprocket pull-down with accelerated Geneva drive has its own directly-connected synchronous motor. The remaining sprockets and shutter are driven by a second synchronous motor. The two systems, engaged temporarily for starting, run mechanically independent to eliminate shock forces and obtain an inherently flutter free sound drive.

New optics throughout give high picture and sound resolution. Tungsten and arc light sources are provided. High quality amplifier, independently driven accessories, turret accommodation for instantaneous lamp

replacement, improved base-up mounting of lamp, and floor mounting are features.

ARMED FORCES 16-MM PROGRAM

U. S. Army Signal Corps

The part that 16-mm sound motion picture projection will play in the Army training and recreational program is outlined. A brief description of the Armed Forces standard 16-mm projectors is given, with particular reference to equipment field maintenance problems and the resultant necessity for major simplification of equipment to insure continuous optimum field performance.

LIP-SYNCHRONOUS RECORDING ON STANDARD UNPERFORATED TAPE

Walter T. Selsted

Ampex Electric Corp.

The use of magnetic tape for film sound recording has many advantages over optical methods. The accessory equipment described, in conjunction with a standard 1/4-inch tape recorder, permits truly synchronous recording and playback; it is compact and easy to use.

A novel circuit arrangement permits the operator to adjust the phase relationships between picture and sound track, which greatly simplifies cueing during playback. The system requires no connection between camera and tape recorder other than the primary power system.

CRITICAL EVALUATION OF COLOR TV

Prof. Arthur B. Bronwell

Northwestern University, Evanston, Ill.

In testimony before the F.C.C. three fundamental systems have been proposed as commercial solutions to the Tv problem. These may be roughly classified as (1) the revolving color filter system (proposed by CBS); (2) the three kinescope system (proposed by RCA), and (3) the three-image, single-kinescope system (proposed by CTI). These three systems have received widespread attention and have been subject to intensive research efforts.

There are other systems, however, which may offer a more satisfactory solution to the color Tv program. This paper presents an evaluation of various methods of producing color Tv pictures, including several methods which have not been widely discussed. They include (1) the stationary color filter systems (replacing the revolving filter disc sys-

(Continued on page 25)

size sprockets by American projector manufacturers may be, even more noteworthy was their reluctance to adopt an intermittent sprocket larger than the 0.935-inch (23.75-mm) size. As long ago as 1930 the Standards Committee of the SMPE recommended the 0.945-inch (24-mm) intermittent sprocket which the Germans had introduced shortly before then.

It has been a matter of bewilderment to technologists on the Continent that the 0.945-inch sprocket became "stand-

ard" in America in 1930, the 0.943-inch (23.95-mm) sprocket in 1947, and that most projector manufacturers in the U. S. A. ignored both standards. Even in 1947, one manufacturer proposed a 0.940-inch sprocket. The introduction of triacetate film having a very low rate of shrinkage has undoubtedly helped the manufacturers make up their minds on this point.

[FIRST OF TWO INSTALMENTS]



TELECASTS

'Golden Era' for Film-Tv Theaters—20th-Fox Prexy

PROPHECYING that the utilization of television will mean a "golden era for motion picture theaters unlike anything they have ever known," Spyrou Skouras, president of 20th Century-Fox told the recent convention of the Society of Motion Picture & Television Engineers that "theater attendance will be tripled within a short time" as theaters are connected to regional Tv circuits.

Skouras revealed that 20th-Fox and its subsidiary National Theaters are negotiating with Amer. Tel. & Tel. to use telephone facilities to link a group of 20 Los Angeles area houses into a large-screen Tv circuit to be in operation by the first of next year.

Films to Be Basic Fare

"If the test on the West Coast fulfills our confident expectations," Skouras declared, "we can look forward to the establishment of four or five competitive networks or circuits in each natural area or time zone of the country . . . to service from 500 to 1000 theaters in each network." Films will be the basic entertainment, Skouras said, with the video attractions to augment programs and, incidentally, eliminating the second feature in dual program houses.

Declaring that 20th-Fox will not supply films to Phonevision, Skouras pointed out that "our first allegiance is to the thousands of theater men who built up this industry," and said the public will be best served through theater Tv. "Let those who say that the theaters will go out of business, because of some gadget installed in the homes, understand once and for all that the motion picture theaters of America will flourish as they have never flourished before," Skouras said.

20th-Fox Working with RCA

The 20th-Fox prexy asked the assembled technical men to concentrate efforts upon the perfection of theater Tv. He reminded that his company has invested large sums in working with RCA to develop large-screen Tv and that Paramount has also made great progress along those lines.

Decision to go ahead with the West Coast test without waiting for allocations of theater Tv channels by the FCC is intended, Skouras said, "to show the

doubting Thomases that they lack imagination and vision."

Referring to the projected theater networks, centered in such cities as New York, Chicago, Denver, Atlanta, Los Angeles, in natural area or time zones, Skouras predicted: "No advertising will be able to compete with this new avenue of employment. Through its great need of talent, theater Tv will attract the services of every good artist of the concert stage, the legitimate stage, the drama, the opera, the motion picture, the ballet as well as all the top popular entertainers, assuring them of a bright and active and remunerative future and opportunities for a greater artistic achievement and greater service to the public.

"This will usher in an era of unprecedented prosperity for the entertainment industry, as well as a period of infinite importance to our understanding of the world we live in, and the international problems that beset us."

* * *

Autry Going All-out For Tv

Gene Autry, "name" Western motion picture star and a terrific box-office favorite with juveniles and more than a few adults, has announced that he will make a series of 15- and 30-minute Westerns for Tv airing under the sponsorship of the Wrigley chewing gum interests. Columbia Pictures, which handles Autry films in the theater but will have no part in the video film production, remained mum on the deal.

Autry blandly announced that his Tv deal will "whet the appetite of theater patrons" for more of him. Yeh, yeh.

* * *

Phonevision 'Rights' Disputed

The contention of Zenith Radio president E. F. McDonald that film companies are "legally obligated" to sell film to his "pay-as-you-see" Phonevision Tv system was disputed vigorously by Abram F. Myers, Allied Theaters counsel, in a special bulletin which attacked Zenith for trying to "muscle in" on the film business. Continuing, Myers said:

"McDonald conveniently . . . overlooks the fact that every manufacturer, acting singly and not in collusion with others, always has had the right to select his

own customers. This always has been and still is the law, and there is nothing in any anti-trust statute or any decision of any court to the contrary.

Myers likened McDonald to the man who wanted to get into the shipping business and was seeking a partner who would supply the ships while he supplied the ocean.

* * *

Key City Tv Sets Increase

Los Angeles passed Chicago to place second only to New York in number of Tv receivers, as of March 1, according to reliable figures. Los Angeles has a total of 448,737 sets. Figure for February 1 was 396,000. It is estimated that one out of every four homes in Los Angeles has a Tv set.

Boston's Tv area now has a total of 339,234 receivers, a jump of 33,414 sets over February. A survey as of April 1, 1950 approximates the number of home receivers at 334,314 and the number in public places at 4,915.

* * *

Big Ten Bans Football Tv

"Live" televising of Big Ten football games will be banned in 1950 because of "conclusive evidence of an adverse effect on attendance," conference athletic directors decided at their recent annual meeting. Post-game use of films of highlights of games involving conference teams, as well as full-game films, will be permitted, although no such program may be televised until 6 p.m. Sunday, the day after the game.

Evidence of the seriousness with which the Big Ten regards Tv competition is had from the fact that the no-Tv rule will cost the conference about \$500,000 in sponsored ad contracts during 1950. Some observers see in the ban the first step in the removal of all college football from Tv screens throughout the nation.

* * *

RCA Color Tv via Coaxial Cable

RCA has demonstrated to the FCC that its color Tv system can successfully be networked on present coaxial cable, upsetting rival claims that it could not go through the present cable bandwidth and emerge in color at the receiving end. RCA still maintains, however, that wireless relay is the ultimate answer to Tv network problems.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

IT IS anybody's guess as to just what will come of the recent flurry of statements by ranking officials of the motion picture industry to the effect that steps will be taken "immediately" to install Tv equipment in theaters; in fact, there has been a definite announcement that a Tv circuit of some 20 houses in the Los Angeles area will be formed. Two Fabian theaters in the state of New York—one in Brooklyn, another in Albany—will have a *permanent* RCA Tv installation within a month.

This is all to the good, of course. But any such development will pose a problem for the projectionist craft as least as serious as that incident to the introduction of sound pictures. Bluntly stated, the question is: "Will we be ready this time?"

We had better be.

This department would welcome word from IA Locals as to just what plans have been formulated (if not actually put into effect) for the training of their members to meet this latest challenge to craft supremacy in the entertainment field. Today the woods are full of pseudo "engineers" who will go to any extreme to get a toehold in the theater field.

Details of any such training programs will be accorded top priority herein.

- IA President Walsh is in Florence, Italy, as a member of the U. S. delegation attending the United Nations Educational and Scientific Cultural Organization (UNESCO). He is expected to return to America about June 20.

- One of the most interesting and popular exhibits at the AF of L's Union Industries Show, held in Philadelphia May 6-13, was a movie showing behind-the-scenes activities of the theatrical industry. The presentation covered every phase of backstage operation, projection room procedures, box-office, film exchange and Tv studio activities. The picture was produced and assembled by Philadelphia IA Locals: Stage Employees No. 8, Projectionists No. 307, Treasurers and Ticket Sellers No. 752, Theatrical Wardrobe Attendants No. 799, Television Broadcasting Studio Employees No. 804, Film

Exchange Employees Nos. B-7 and F-7, and Theater Employees No. B-100.

- The sudden death last month of David E. ("Davey") Day, member of Chicago Local 110, while vacationing in Clearwater, Fla., shocked his many friends in the Alliance. He was buried in Chicago with Masonic services, officiated by the Master of Triluminar Lodge No. 767, AF & AM, of which Davey was a long-time member. He is survived by his widow, a son and a daughter, and six grandchildren. Davey was an esteemed member of the 25-30 Club of New York.

- The formal opening of Los Angeles Local 150's new headquarters was celebrated several weeks ago with an open-house party that lasted from 10 o'clock in the morning until 9:30 in the evening. The IA official family was represented by Carl Cooper, 7th vice-president, who made the dedicatory address, and Steve Newman, International representative.

A gold life-membership card was presented to Frank Sawyer, a member of Local 150 since 1909. Although Sawyer is no longer active in the craft, he is very active in Local affairs and seldom, if ever, misses a meeting. Another gold-card

holder, "Pop" Kenton, dispensed some sage advice to the younger members present at the affair.

- California Locals Nos. 150, Los Angeles; 297, San Diego; 504, Santa Ana; 521, Long Beach; and 577, San Bernardino, recently signed new contracts calling for a 10c-per-hour increase, retroactive to July 1, 1949. In addition, the new contracts contain vacation clauses giving projectionists employed by a company or a theater for one year or more, but less than two years, one week's vacation with pay; those employed for two years or more will receive two weeks' vacations with pay.

Other special features of these new contracts are the television and employment-termination clauses, which protect the interests of the Local Union men. Although Local 521 contracts have carried the television clause for the past four years, it is now referred to as an "IA clause."

- Jack Miller, member of Chicago Local 110, and for many years a popular figure at IA conventions, died recently following a brief illness. Miller joined Local 364, Akron, Ohio, a number of years ago,

GALA PARTY LAUNCHES NEW TMA LODGE, NO. 141, IN WESTCHESTER COUNTY, N. Y.



Shawn at installation ceremonies are (from left): Frank Pierce, sgt.-at-arms; Jahn F. McGuire, fin. sec.; Anthony Popp, trustee; Charles P. Schappach, treas.; Edward C. Ferguson, trustee; Phil Hitter, Grand Lodge sec.-treas.; Fred W. Perschke, chaplain; Larry Sabatino, pres.; Paul M. Harris, trustee; Albert W. Fried, Grand Lodge trustee; Milton R. Strauss, rec.-sec., and Joseph Stern, vice-pres. This marks the start of a nation-wide expansion program.

LOCAL 150 DEDICATES NEW HEADQUARTERS



(Photo by Bert Vaughn)

Celebrants shown above (l. to r.): Int. Rep. Steve Newman, IA 7th vice-pres. Carl Cooper, Local 150 Pres. Earl C. Hamilton, and gold-card members Frank Sawyer and J. B. (Pop) Kenton. Los Angeles fellows invite a look-see at these quarters when next you're West.

later moving to Chicago where he became a member of Local 110. He retained membership in both Locals. John Shuff, business manager for the Akron Local and a close personal friend of Miller's, was among the many out-of-town IA men who attended the funeral services.

• One of the nicest gentlemen we know, and a tireless worker in behalf of labor, was given due recognition recently when George Jones, secretary of Toronto Local 173, was feted by his brother members and tendered a handsome gift in appreciation of 34 years of continuous service as an officer of the Local. George is a down-the-line labor man and has earned all the honors that come his way.

Incidentally, William P. Covert, IA 2nd vice-president and business manager for Local 173, and Pat Travers, assistant business manager, rendered yeoman service in the fight waged by the Ontario Provincial Federation of Labor in con-

vincing the government, premier, cabinet, and the legislators of the need for a reduction of the amusement tax, which resulted in a substantial tax reduction, effective April 1 last.

Also in the thick of the fight was our old friend, Hugh Sedgwick, secretary and business manager for Local 303, Hamilton, Ont., who recently was unanimously re-elected secretary of the Provincial Federation. Proving once again that joint action and hard work in a common cause by sectional Locals carries a potent wallop.

• All discussions held at the technical sessions of the recent SMPTE convention in Chicago were tape-recorded. These recordings were made under the supervision of Clyde Cooley, secretary of Omaha Local 343, assisted by Howard Jackson, business manager of the Local.

As usual, the National Carbon headquarters was a favorite gathering spot, thanks in large measure to the geniality and hospitality of Bill Kunzmann. National's C. E. Heppberger ably assisted Bill in rolling out the welcome mat. Also, we spent considerable time at Motiograph's headquarters, where Thor Matthews, company executive, presided and welcomed the guests.

The projectionist craft was represented by the following: Clarence Jalas, Chicago Local 110 secretary; Charlie Hahn, McAuley Mfg. and an ex-projectionist; I. Jacobson, Jerry Daley, J. B. Pesek, Bobbie Burns, Jack Behlke, Roy McCracken, and Bill Gramer—all members of Local 110.

• Mike Mungovan, vice-president of the N. Y. State Federation of Labor and business manager of Rochester Local 25, has been appointed by State Industrial

'SHOW PEOPLE'S' CLINIC BENEFIT TOPS



A fine example of labor-management cooperation was had when IA Local 415 and Musicians Local 771 teamed up with all theater owners and managers in Tucson, Ariz., to stage a benefit that resulted in \$1111.15 proceeds for the Square and Compass Crippled Children's Clinic. Shown above at check-presentation ceremony are (seated):

Walter Burrows, Local 414 secretary; Frank Minarik, president of the clinic; 7-year-old clinic patient, Jerry Keehl; and (standing) Fred McSpadden, Clifford Vance, theater representatives; George Codd, general chairman, and Ernie Lewis, sec. of musicians' Local.

Commissioner Edward Corsi a member of the nine-man statewide board to study the problem of minimum wages to be paid the various types of workers in the amusement industry. The board's findings will be available within two months, and it is expected that they will aid in establishing minimum wage standards for many types of work in the general amusement fields which are not now covered by state or federal laws.

• R. M. (Morrie) Volkmar, old-time member of Minneapolis Local 219, died recently following a heart attack. The list grows much, much too long.

• Boston Local 182 celebrated its 40th anniversary last month with a sumptuous dinner-dance at the Copley Plaza Hotel. Prominent among the honored guests were Governor Paul A. Dever of Massachusetts, Mayor John B. Hynes of Boston, IA President Walsh, members of the official IA family, and representatives from many nearby Local Unions.

Ben Hull, Assoc. Commissioner of Labor & Industry for Mass., and a member of Springfield, Mass., L. 186, greeted many long-time IA friends.

Joseph Nuzzolo, president of the Local introduced the 16 charter members, each of whom was presented with a gold ring bearing the IATSE emblem, inset with two rubies. Brief addresses by Governor Dever and IA President Walsh were warmly received by the gathering, who also witnessed the presentation to Walsh of a "Ruby Jubilee Citation" in the form of a beautiful scroll, in appreciation of his outstanding leadership of the IA.

U. S. Labor Secretary Tobin was made an Honorary member of the Local. Thomas Shea, assistant IA president,

VETERAN TORONTO PROJECTIONIST HONORED 'FOR 34 YEARS OF FAITHFUL SERVICE'



George Jones, present sec.-treas. and who has held office in Toronto L. 173 continuously for 34 years, is presented with a gold watch and chain inscribed with the IA crest and the inscription quoted above. Making the presentation is 2nd IA vice-pres. William P. Covert, and looking on are Local 173 officials: James Strugess, pres., Harry Jarmain, vice-pres., and Pat Travers, acting bus.-mgr.

Picture on wall at upper left is of James Simpson, one of the Dominion's great Labor figures and a former mayor of Toronto.



IA President Richard Walsh receives from Joseph Nuzzolo, president of Boston L. 182, a 'Ruby Jubilee' scroll attesting to outstanding services in behalf of Labor. Occasion was the 40th anniversary of L. 182.

and Wm. P. Raoul, IA secretary-treasurer, were presented with beautiful travelling clocks.

Among the exhibitors present were Martin J. Mullin, president, and Edward A. Cuddy, general manager, New England Theaters; Benjamin J. Domingo, RKO; Charles E. Kurtzman, Loew's; Arnold Isen, B & Q, and Harry I. Wasserman, ATC.

Arthur E. Meyer represented International Projector Corp., while C. S. Perkins headed the service engineers for Altec Service Corp.

Joe Cifre, president of the Local back in 1917, was the general chairman of the festivities; co-chairmen were Joseph Nuzzolo, Sr., and Walter F. Diehl.

• Had not H. C. Yopp, member of Local 597, Waco, Texas, been so conscientious he would not be lying in a hospital today suffering from burns received while trying to extinguish a fire in the projection room of the Fox Theater in that city. Severe burns about the face and head, and extending on his right arm from fingers to shoulder, will keep this courageous projectionist hospitalized for many weeks.

IP has repeatedly stressed the grave danger to projectionists inherent in projection room fires. Once a fire breaks out the projectionist should pull the arc switch, close the douser—and make a speedy break for the exit, at which point should be positioned the control means for dropping the ports. Theater property can be replaced; a man's life, never; not to mention the possibility of a lifetime of suffering.

• Negotiations between Vancouver Local B-71 and the distributors, pending since August 1949, were finally settled through the efforts of IA Representative Orin M. Jacobson. The exchange employees were granted a wage increase of 12% retroactive to August, 1949; and although the distributors objected to the retroactive pay, they quickly signed upon learning that a strike vote was carried. Nice going, Jake.

• Obligated to membership in the 25-30 Club of New York at the last regular meeting were the following members of Local 384, Hudson County, N. J.: Frank Mandrake, pres.; George Wedemeyer, vice-pres.; Frank Maurus, executive board member; Larry Abbott, and Frank Pileggi. Other Local 384 men are expected to take the obligation shortly.

• Many reasons are offered by exhibitors for the drop in box-office receipts—home Tv competition ranking first. While it is true that home Tv has cut down movie attendance, much of the blame may be laid at the doorsteps of the exhibitors themselves. We learned recently that a certain theater circuit cut 1100 feet from the feature picture "Samson and Delilah," in addition to eliminating the musical score played at the beginning and the end of the picture. Why? The answer is simple: to avoid paying overtime to the projectionists. And this at *advanced admission prices!* Petty larceny to the point of self-extinction.



Forty-year members of L. 182! Charter members (1910) shown are (from left): Charles Parker, Joseph Rosen, Peter Cowan, Nat Max, John Spence (partly hidden); Norbert Brink, Albert J. Reith, Sr., Harry Rotman, and George W. Cole.

• *Out-of-town visitors:* Otto Nordling, Ottawa, Canada; John Milne, London, England; Herb Starke, Los Angeles Local 150 and inventor of the popular Cyclo-ramic screen; Charlie Hahn, J. E. McCauley Mfg. Co.; and Herb Griffin, International Projector Corp.

First Listing of IA Men Who Are Amateur Radio Fans

Following through on the suggestion made by Amos R. Kanaga, secretary of Local 409, San Mateo, Calif., IP presents here the first listing of IA members who are amateur radio enthusiasts. The irrepressible Amos, with the help of IA men in other districts, is even now scouring the country in an all-out effort to list at least 200 IA radio "hams."

This first listing of amateur stations operated by IA men is quite detailed, but if Amos makes good on his promise of an extended list, all future listings will

necessarily have to be confined to the bare details of call letters and Local Union numbers.

Mentioning the "IA rag-chewing and traffic frequencies" as from 3950 to 29,000, Amos asks that all IA men whose hobby is amateur radio send along to him their QSL cards and not neglect to give their Local Union number.

IP intends to maintain this list in up-to-date fashion on a permanent basis, and while the list may not be published in every issue, any IP subscriber may obtain a copy at any time.

CALL	NAME—LOCAL NO.	ADDRESS
W2TSN	Victor Bufis—L. 365	R.D. No. 2, Blairstown, N. J.
W2WZX	Erich Pattky—L. 244	26 Hall St., Delawanna, N. J.
W4NOM	Buddy Rogers—L. 225	1369 Hardee St., N.E., Atlanta, Ga.
W6BAA	Amos Kanaga—L. 409	623 Capuchino Dr., Millbrae, Calif.
W6MTO	LeRoy Wardell—L. 762	PO. Box 84, Oceano, Calif.
W7FJZ	Z. A. Sax—L. 159	1917 S.E. Ladd Ave., Portland, Ore.
W9OL	W. P. Atchison—L. 323	1616 So. 2nd St., Springfield, Ill.
W9NPG	John B. Bain—L. 323	2304 So. 9th St., Springfield, Ill.
W0GSW	Jim Evans—L. 242	404 E. Jackson St., Pittsburg, Kans.
W0JKU	John Cresap—L. 242	602 W. 2nd St., Pittsburg, Kans.
In Canada		
VE3ABV	Jack Snider—L. 173	106 Central Park Blvd., Oshawa, Ont.
VE3BAK	Fred Winkle—L. 173	987 Greenwood Ave., Toronto, Ont.
VE3BVC	E. H. Whyatt—L. 173	79 Helena Ave., Toronto, Ont.
VE3BWG	Lou Lodge—L. 173	241 Gainsborough Rd., Toronto, Ont.
VE3DBF	Murray Winslow—L. 461	St. Catherine's Ont.
VE3OG	Harold Horner—L. 173	295 Jarvis St., Toronto, Ont.
VE3TE	Tom Burrows—L. 173	311 Beechgrove Dr., West Hill, Ont.

NEWS PROJECTIONS

Jottings of happenings which, while mostly of a non-technical nature, have a bearing upon general industry welfare and progress.

Earnings for Paramount Pictures in its first quarter as a producer-distributor only were \$1,400,000, after taxes but not including the company's share of earnings from non-consolidated companies, principally Allan B. DuMont Labs. . . . Technicolor had a record net earning of \$2,354,083 last year. A total of 44 pictures were produced last year, as contrasted with the previous high of 39 in 1948. . . . Loew's, Inc., in the 28 weeks ended March 16 had a net income of \$4,986,963. . . . Loew's, Paramount and Warners told the FCC that their records as licensees of radio stations is positive justification for continuation of their licenses. FCC holds to view that anti-trust violations by the three companies (in the motion picture field) disqualifies the trio as radio licensees. . . .

Allen B. DuMont Labs has once again stated flatly to the FCC that the company is not and has never been controlled by Paramount. . . . Net profits of Famous Players Canadian Corp. for 1949 were \$3,071,910. Slight decline from 1948 mark was due almost entirely to higher taxes. . . . Motion Picture Assoc. of America intends to bar the release of all new and reissue films which feature performers unfavorably in the public eye. Release would be held up for a "cooling off" period. . . . Warners have had excellent results with a sound-proofed Diesel generator which can be moved to within 300 feet of the studio set, as contrasted with the 1000-foot limit necessary heretofore. . . . Not only today's but tomorrow's movie audience is hit by Tv: in Perth Amboy, N. J., 60% of elementary school pupils make Tv their first choice; only 12% voted movies the preferred form of entertainment.

American Tel. & Tel. estimates that its coast-to-coast Tv net facilities will be completed by the end of 1950 or early in 1951. . . . Filmitees not satisfied with proposed slash to 10% in admissions tax. Want Congress to vote elimination of entire tax. Chances of latter happening appear very slim. . . . Neighborhood movie theater business in the Carolinas shows an over-all drop of about 15% from last year, exhibitors report. . . . Another angle employed by major U. S. companies to thaw "frozen" British funds is to buy the Western Hemisphere rights to features produced by J. A. Rank and others. A bad deal for Hollywood technicians. . . . "The right to show a motion picture is merely a privilege," the Supreme Court was told by the Boards of Censors of Memphis and Shelby counties, Tenn. . . . "Forced" percentage

deals may be on the way out in favor of flat rentals, if major exhibitor groups win the present fight against distributors.

Don't be surprised if magnetic recording, now used widely in the studios, soon invades the theaters. . . . N. Y. Times survey reveals a 30.2% decline in amusement advertising during 1949. Could this be a direct link with falling attendance marks? . . . Last year there were 1222 drive-in theaters operating in the U. S., with 121 more having been added since Jan. 1. . . . Paramount has completed its acquisition of 500,000 shares of its own common stock at \$21 a share. Future buy-ins are contemplated. . . . Tv, which accounted for half of RCA's gross income last year, hit the 60% mark for the company during the first quarter of 1950.

AF of L Film Workers Protest Picture-Making in England

The Hollywood A. F. of L. Film Council has asked the U. S. State Dept. to aid in checking attempts "to move a large part of American film production to England." Anglo-American film agreement, which is about to expire, has resulted in more and more American pictures, de-

signed for the American market, being made by American companies in England, employing English workers at cut-rate wages far below American standards.

The Council pointed out that "the popular conception of the American motion picture industry as robust and healthy is a false one," and added that "the employment of skilled and unskilled manual labor in Hollywood film studios has plummeted from 24,000 in 1946 to 13,000 in March of this year.

Picture production in England by American companies is done in large measure to realize upon the large amount of "frozen" English pounds due American producers.

Tv Seen Fixing Leisure Pattern

Says Harriet Van Horne, noted radio and Tv commentator for the Scripps-Howard newspaper chain: "Given at least 5 million Tv sets now in use with an average—I'm guessing—of four persons watching each, and it's plain that the leisure pattern of some 20 million persons is becoming fairly fixed." Miss Horne understates the situation by several thousand miles.

New RCA Oscilloscope 'Holds' Billionth-Second Signal

A storage oscilloscope, capable of "freezing" for a full minute electrical signals or traces which occur in a billionth of a second, has been demonstrated by RCA. The device, based on the Graphecon—a tube with "visual memory" developed by RCA*—and the use of a television screen instead of the conventional oscilloscope, permits the photographing of instantaneous phenomena which previously had been impossible to see and extremely difficult to photograph.

"The trace resulting from a miniature atomic 'explosion' may occur on the screen of an oscilloscope in a billionth of a second," states RCA. "The human eye can't detect it for study and it can be photographed only on super-sensitive film. The storage oscilloscope can probe

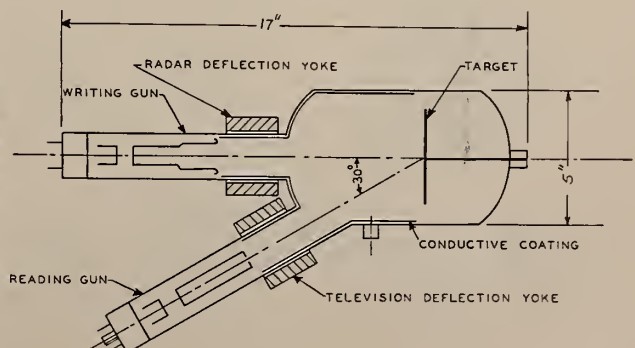
the secrets of other devices and processes, less dramatic than nuclear fission, perhaps, but of great importance to our everyday living.

"It can record and retain a trace indicating exactly what happens when a circuit breaker is opened and a current leaps across the gap, thus making possible the development of better breakers which will give the public better electric service."

The Graphecon tube has a target on which an electrical charge, such as an oscilloscope or radar trace, can be "written" at any speed desired by an electron gun. The charge, or signal, is scanned or "read" off the reverse side of the target by an iconoscope-type electron beam such as is used in television. The beam may take as long as 60 seconds to completely remove the charge—thus providing the storage period. The signal is then amplified and applied to a kinescope, or television viewing screen, for inspection or photographing.

* "New Graphecon 'Memory' Tube"; IP for September, 1949, p. 30.

Graphecon 'memory tube,' heart of which is a metal target 3" square coated on one side with a layer of pure quartz 20 millionths of an inch thick. Two beams in the legs of the V-shaped tube are aimed at this target: the radar beam "writes" thereon, while the other beam (such as is used in a Tv camera) 'reads' from it.





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MORE LIGHT...the four inch diameter Super Snaplite gives you an f/1.9 lens in focal lengths as long as 7 inches!

LONG LIFE...one piece mount, specially sealed lens elements, anodized finish that can't flake off—all spell longer, top-notch performance for the four inch diameter Super Snaplite!

Four inch diameter Super Snaplites are available, to order, in focal lengths from five up through seven inches, in quarter inch steps. In all these focal lengths the true effective speed of f/1.9 is maintained. Four inch diameter Super Snaplites are also available, to special order, in focal lengths longer than seven inches, at somewhat slower speeds.



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Brooklyn 11, New York

Optical **CORPORATION**



Flagrant Abuse of M-G Set

A prominent manufacturer of motor-generator equipment submits the following which, originally written some years ago, still retains its pertinacity relative to prevailing operating conditions in the motion picture theater field:

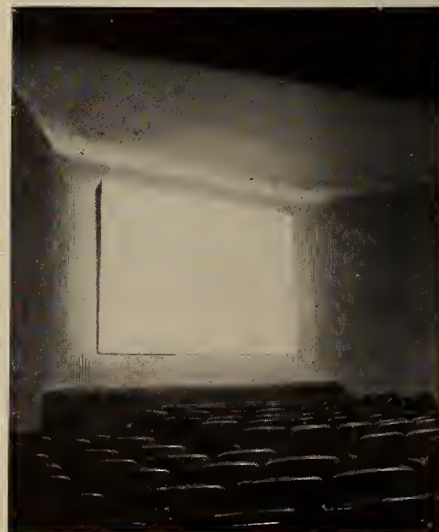
"In all our experience we have never seen any M-G set or motor which had been so excessively greased as this particular equipment. Not only was the inside of the driving motor half filled with grease, but the generator fields and interpoles were buried in grease almost out to the commutator end.

"The grease removed from the generator alone was found to weigh 3½ lbs.—about 56 times the normal amount required for one bearing. Evidently in error, they used a pressure gun and kept on pumping it in. The carbon brushes were of an unidentified make, size and grade totally unsuited for this class of service. Their use caused poor regulation and excessive commutator wear.

Major Overhaul Necessary

"To place this unit in serviceable condition, it was necessary to entirely disassemble, thoroughly cleanse all parts—replace both bearings, re-insulate, dip and bake the armature, field and interpole coils; true, undercut and polish commutator; replace carbon brushes; readjust brush holders and rocker arm for neutral point of commutation; subject to complete test, including operation

THE HAMILTON THEATER, BERMUDA



No "picture-frame" effect by means of the elimination of masking and the absence of the conventional proscenium opening is shown here, the contribution of Ben Schlanger, the modern-minded architect whose work was discussed in IP last month.* Convergence of the forward side walls, only a little wider than the screen itself, positions the screen image in a "natural" field of self-created light.

* "Renewed Interest in the Maskless Screen"; IP for April, 1950, p. 11.

under load for period twice the regular duration to determine performance and fitness to re-enter service.

"The bearings failure was due to over-greasing. Excessive commutator wear was due to the use of improper brushes and the lack of ordinary care. Careful lubrication once a year combined with cleanliness will contribute to the building of confidence and satisfaction for both user and manufacturer."

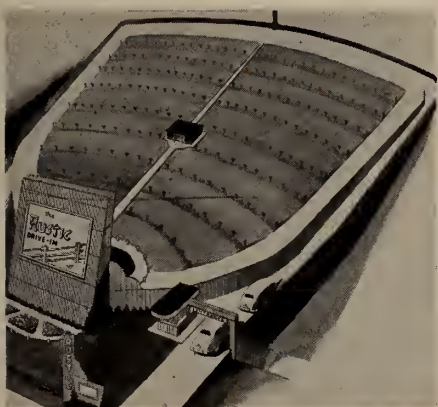
RKO Theaters Divorcement

A Federal Court in New York has granted the RKO Corp. an extension until Dec. 31 this year in which to complete the divorcement of the latter's theaters from its studio operations. Also, RKO may play its own pictures in its theaters during the same time period. U.S. Dept. of Justice had sought to have a trustee appointed to effectuate divorcement within the time limit originally set—May 8 of this year.

RKO fought with all its might to have the effective date advanced to Feb. 8, 1953, contending through its president, Ned Depinet, that the "company's financial position was difficult, that it stood to lose \$1 million in the first quarter of this year, and that it needed more time in which to arrange for additional banking credit.

More 'Doctored' Attendance News

Attendance at theaters operated by 20th Century-Fox subsidiaries, including the giant National Theaters chain on the West Coast, declined only 6% from 1948 returns and in money receipts by only



BALLANTYNE 'PACKAGED' DRIVE-INS

Low initial cost, low maintenance cost and fine construction featuring Northern Michigan white cedar logs and saplings that harmonize with the natural surroundings of out-of-doors, comprise the Ballantyne Co. "packaged" drive-in theaters, recently announced. Every item necessary for a well-rounded theater operation is included in this deal, starting from a bare tract of land. A handsome brochure giving complete details of this offer, including exact specs, is available from Ballantyne at Omaha, Neb.

5%, according to the annual report of the parent company.

What will happen in the next fiscal year with the trial balances of the major company motion picture companies, in terms of "public acceptance" profit-and-loss statements (a term long beloved by stockholders) by the general public has yet to be evaluated.

PERSONAL NOTES

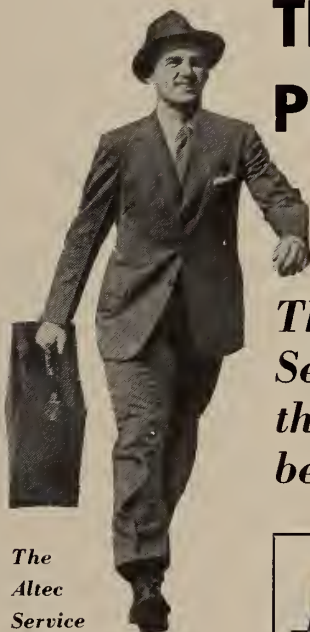
DONALD E. HYNDMAN has been promoted to U. S. sales manager for Eastman Kodak's professional motion picture film division. He succeeds K. M. CUNNINGHAM, who has been

Donald E. Hyndman named Kodak professional motion picture film sales manager.



assigned to other duties. Hyndman, with Eastman's film sales department in New York since 1929, will be succeeded as manager of the East Coast division by E. M. STIPLE, identified with Eastman for the past 19 years. Hyndman's new post will occasion his re-

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the organization
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moval to Rochester, N. Y. A former president of the SMPE (now the SMPTE) Hyndman is among other appointments, a member of the Society's important theater Tv committee.

DR. ALFRED N. GOLDSMITH, one of America's outstanding consulting engineers, was paid a tribute of acknowledgment by his associates of RCA Laboratories as the inventor of the new RCA color Tv tubes which are expected to revolutionize the video art. A frequent contributor to these pages, Dr. Goldsmith is an honorary life member of IA Local 306, N. Y. City, and of the 25-30 Club.

HARRY B. ALLINSMITH, formerly regional manager for the Far East division of Westrex Corp., has been named managing director of Western Electric Co., Ltd., London, England, subsidiary of Westrex. He succeeds M. A. GOLDRICK, who will return to New York to assume AllinSmith's old post. AllinSmith has many projectionist friends.

Beaumont Honors IA Man

W. N. "Pat" Scarborough has been re-elected President of the Beaumont, (Texas) Trades and Labor Assembly. Active in labor circles since 1907, Pat has been a member of IA Local 183 since 1917. His IA affiliation goes back farther than then, however, since in 1907 he joined what was then the bi-city Local 85 which included Houston and Galves-

ton. Subsequently, Local 51 was established and Pat retained his membership therein until he joined Local 183. This will mark Pat's third term as President of the Trades and Labor Assembly, in addition to which he has held every office in his own Local. Upon being inducted into office, Pat pointed out the fine record of the AF of L in Beaumont which made possible the tremendous growth of



W. N. 'Pat' Scarborough

unionism during the past few years, and he asked for unity and progress during the vital months just ahead.

Pat has been very active in civic affairs, formerly having served as city councilman and head of the traffic committee, and he is now a key man in the citizens' advisory group to the city administration.

IA ELECTIONS

CALIF. DISTRICT COUNCIL NO. 2

William Wise, L. 297, San Diego, *pres.*;
Ralph Adams, L. 504, Santa Ana, *vice-pres.*;
Alonso S. Bennett, L. 521, Long Beach, *sec.-treas.*

LOCAL 162, SAN FRANCISCO, CALIF.

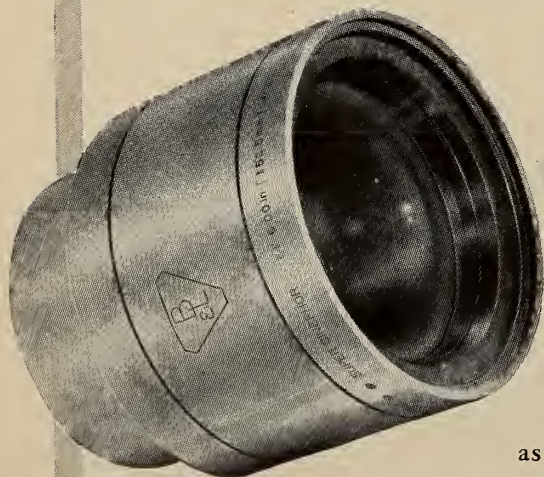
John A. Forde, *pres.*; Orville G. Roush, *1st vice-pres.*; Robert M. Wilson, *2nd vice-pres.*; Raymond Kirkpatrick, *3rd vice-pres.*; R. M. Combs, *4th vice-pres.*; William Van Ornum, *5th vice-pres.*; Floyd M. Billingsley, *bus.mgr.*; Thomas J. Kearney, *sec.-treas.*; Antone J. Salemi, *sgt.-at-arms*; Roush, Wilson, Kirkpatrick, Combs, and Van Ornum, *exec. board.*

LOCAL 277, BRIDGEPORT, CONN.

Roland J. McLeod, *pres.*; Frank Toth, *vice-pres.*; Thomas E. Colwell, *rec.-sec.*; Leroy Nickerson, *fin.-sec.*; Fred Lewis, *treas.*; John A. Martin, *bus.mgr.*; John C. Lynch, *sgt.-at-arms*; John Benard, Harold Ryckman,

NEW! **f/2.0** Super Cinephor Lens Series

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IMPROVEMENT
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● **LARGER AUDIENCES** (particularly in drive-ins)—made possible by brilliant, improved illumination.

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● **GREATER AUDIENCE SATISFACTION** . . . they'll appreciate seeing pictures that bring them closer to the actual living scene as it was filmed by the studio.

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FOR TOP IMAGE QUALITY ON YOUR SCREEN . . . THE  TRADEMARK ON YOUR LENS

BAUSCH & LOMB *Super Cinephor* **PROJECTION LENSES**

Frank Gorman, Joseph C. Cossette, *exec. board*; Leslie C. Blakeslee, James Liburdi, William Towle, George Antoniak, Harry Kaplan, *trustees*; James Leverone, L. Nickerson, R. McLeod, J. Benard, Joseph Cink, *del. CLU*; Martin, McLeod, *del. IA Convention*; Toth and Ryckman, *alternates*.

MONTHLY CHAT

(Continued from page 3)

sional motion pictures—have been available for ready application to the production and exhibition fields for the past five years, if not longer. But the lush box-office "takes" for the years 1946-47-48 induced in industry executive personnel a somnolence and a feeling of such utter contentment and assurance that that which had been for so many years could never be anything else, could never be hurt, much less worked into a spot where it would be necessary for its overseers to fight hard for its very survival.

In the long list of stupidities perpetrated by motion picture executives down through the years there is no more disgraceful section than that pertaining to the handling of the motion picture-TV relationship. Several years ago the Tv people, literally standing with hat in hand, were begging the motion picture business to join them and help in furthering the progress of both arts. But the film people were disdainful of this budding art—if not, in fact, more than a little bit afraid of an enterprise which would disturb the cozy normalcy of an operation which was doing nicely, thank you. Today the rampant Tv industry, exhibiting indifference, if not contempt, for film industry leadership, is forging ahead strictly on its own—and it is the mightily (?) motion picture industry which is struggling to make headway through the dust cloud raised by the whirling progress of Tv.

Ringier declarations, indeed, a tidy collection of fighting phrases. But the day of battle is at hand—right this hour, this minute—and the struggle will be won not by phrases but by armament—those implements for battle which should have been carefully stockpiled down through the years in the form of FCC approval of channels, equipment development, program planning, the training of technicians, the integration of Tv programs with the usual theater fare—all these elements for battle

should now be ready for use, not just in the planning stage.

Too late, Mr. Motion Picture Executive? It's a hell of a lot later than you think.

Cooley Sets Pola-Ray Screen Corp.

Laurel E. Cooley, associated with Da-Lite Screen Co., Chicago, for the past 24 years, the past five as vice-president and treasurer, has resigned his post to organize the Pola-Ray Screen Corp., with offices at 207 Security Building, Pasadena, Calif. Pola-Ray will specialize in the production of seamless silver and white theater frame-type screens, and seamless silver sheets suitable for three-dimensional projection. The new plant, to be in the vicinity of Los Angeles, is expected to open Aug. 15 next.

Manas Foot Oscillator Recommended

Recommended by foot specialists as providing quick relief for tired, aching feet is the Manas Foot Oscillator which, through "massagic-action," helps restore circulation and relax foot muscles. Not only for those who, like projectionists, incur foot discomfort as an occupational hazard, but for all the family, the Manas Oscillator is warranted to give complete satisfaction or the purchase price of \$21.95 will be refunded after seven days free trial. Address Oscillation Equipment Co., 132 West 72nd St., New York City, 23.

SMPTE 67th CONVENTION

(Continued from page 16)

tem); (2) the phosphor resonance system; (3) the single-screen systems with chromatic separation, and (4) the parallel-screen system with chromatic separation. The relative advantages and inherent difficulties of each system will be presented in the paper.

CHARACTERISTICS OF MOTION PICTURE AND TV PROJECTION SCREENS

Francis B. Berger

General Precision Laboratory, Inc.

Two fundamental factors, gain and reflectivity or transmission, determine the suitability of a screen material in any particular application. High gain, which necessarily implies a narrow viewing angle, may be de-

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sirable in one application but not in another. The reflectivity or transmission of the screen material is a measure of the light efficiency.

Comparative figures for several commonly used screen materials are presented. Both front and rear projection screens are considered. Fundamental photometric concepts are reviewed and laboratory equipment is described. The figures are considered to be accurate to within about 5%, and are in reasonable agreement with the few published figures available. Detailed data and subsequent tests is expected shortly.

PHONEVISION PROGRESS

John R. Howland
Zenith Radio Corp., Chicago

Phonevision was premiered before the SMPTE Annual Meeting in New York last year. This year, Mr. Howland will discuss the economic aspects of this new subscription Tv system and describe the tests which will be carried out later this year in 300 Chicago homes with the cooperation of Illinois Bell Telephone Co. and the authority of the F.C.C.

Although the Zenith Tv transmitter will probably be unavailable in April in view of alterations which increase its power for use in the test, a film demonstration of Phonevision will be presented over the Zenith theater projection Tv receiver if suitable Tv broadcast facilities can be secured.

100-MILLION-FRAME-PER-SECOND CAMERA

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Shock waves close to the edge of explosive charges have been successfully photographed at rates exceeding 100,000,000 frames per second. These ultra high framing rates are obtained with a multi-slit focal plane shutter which is transported optically across the film plane by a rotating mirror.

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DIFFERENTIAL CARBON FEED SYSTEM FOR PROJECTION ARC LAMPS

Arthur J. Hatch

The Strong Electric Corp.

The general principle of the differential carbon feed system for projection arc lamps is outlined. With a differential feed increment applied selectively to either carbon through the action of a crater position sensitive device, maintenance of crater position in relation to lamphouse optical system as well as constant total feed rate is obtained. As a result of the small change of negative burning rate with change of current, complete feed control of both carbons through their entire amperage range is had with but one manual control set to the amperage desired. Fans on the carbon feed motors supply air to a jet which stabilizes the arc and keeps the products of combustion off the reflector.

NEW HEAVY-DUTY THEATER PROJECTOR

Herbert A. Griffin

International Projector Corp.

The projector mechanism to be described, the Simplex Model X-L, is the result of years of experience in making equipment to satisfy the exacting demands of theater and studio service. Design features such as simplification of the gear train, continuous oil bath lubrication of all rotating components, a new one-piece cone shutter operating immediately adjacent to the aperture for sharpest cutoff, mounting facilities for new fast 4-inch diameter lenses, and many others will be pointed out and illustrated. Performance data will be given.

SOME COMMERCIAL ASPECTS OF A NEW 16-MM INTERMEDIATE FILM TV SYSTEM

R. L. Garman and Blair Faulds

General Precision Laboratory, Inc.

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comparable to Tv broadcasting. A new 16-mm intermediate film system designed for these requirements is described. The system includes video recording equipment for pickup of coaxial-line or broadcasting programs, high-intensity film projection equipment, and an automatic rapid film processor.

The use of the rapid film processor is discussed in connection with delay techniques for adequate program scheduling. General operating characteristics are analyzed in terms of economics of the system. The paper concludes with a demonstration of typical film recordings, processed under actual conditions, and projected with the recommended equipment.

PHYSICAL PRINCIPLES, DESIGN AND PERFORMANCE OF A NEW H-I. PROJECTION LAMP WITH BLOWN ARC

Edgar Gretener

Dr. Edgar Gretener, A.G., Zurich, Switzerland

The Ventarc lamps represent a new series of H-I cinema arcs recently developed by Gretener at Zurich. The blown arc of the new lamp produces a distribution of brilliancy which is highly advantageous for the illumination of the aperture. By using a new negative electrode the arc can be pushed up to an extremely high brilliancy. The precision feed control of the Ventarc insures a perfect homogeneity and invariability of the screen illumination.

The visible radiation of the arc is effec-

tively concentrated on the projector aperture by an entirely new optional system. Heating of the film is minimized by eliminating all invisible radiation. No surplus energy not useful at the screen has to pass through the film. A 100-ampere model of the new lamp will be used to project a sound film explaining operational principles, and will be available for inspection and demonstration.

PROGRESS REPORT ON AN EXPERIMENTAL ELECTRONIC BACKGROUND PROJECTOR FOR TV

Wayne R. Johnson

Earle C. Anthony, Inc., KFI-TV, Los Angeles

The system is an electronic version of the process screen now used in motion pictures and Tv. Two Tv cameras may be mixed without superimposition. A contrasting white background screen in back of the foreground subject, which is always brighter than the subject, provides contrasting information. This information keys the two cameras on or off through an electronic switch.

Details of the signal selection, modification of the keying signals and the use of delay lines are discussed.

PHOTO-SENSITIVE DEVICES, EXCITATION SOURCES

May Benson

McKay Research Laboratory, Chicago

This paper will discuss (1) photo-emissive (2) photo-conductive and (3) photo-voltaic devices and their excitation sources. Early investigations made to extend the response of the photo-emissive type tube into the far infrared, and the advantages that would have been gained in so doing will be mentioned, along with the characteristics, spectral responses, sensitivity and non-homogeneity of this type of phototube.

A discussion of early attempts to use selenium tubes in sound reproduction, and the history and development of thalofide and lead-sulfide cells will be given. The characteristics, spectral responses, sensitivity and homogeneity of photo-conductive tubes and layers will be outlined. Excitation sources for S1 and S4 surfaces, thalofide and lead-sulfide phototube characteristics, their threshold frequencies, and spectral utilization of excitation sources will be examined.

DOUBLE- AND SINGLE-FILM 16MM PROJECTORS WITH VARIABLE PICTURE SOUND SYNCHRONIZATION

George W. Colburn

George W. Colburn Laboratories, Chicago

A double film 16-mm sound projector designed to allow picture sound film synchronization to be altered with both films running will be described and demonstrated. The calibrated control has a \pm four-frame range and operates by shifting a self-compensating idler assembly in the chain drive to the film sprockets. A progress report will be given on a similar single-film machine which should be useful in both laboratories and in Tv studios running older and foreign films, many of which are printed in poor synchronization. Extension selsyn control to the main picture monitor control console is an intriguing possibility which would lighten the projectionist's burden and improve the quality of the sound film performance.

HEATING OF FILM BY HIGH-INTENSITY ARCS

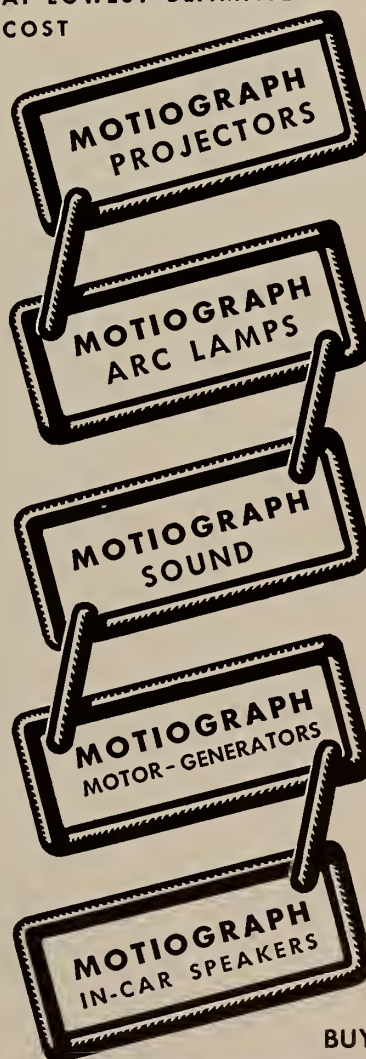
(Continued from page 12)

filtered arc light at 95 lumens per watt; uniform illumination over the gate.) Bearing in mind the assumptions and simplifications which have to be made in such a theoretical treatment as this, this is in remarkably close agreement with experience and with measurements made on various projectors.

It is clearly of no use to try to relate the maximum temperature which the base will withstand in the gate to the

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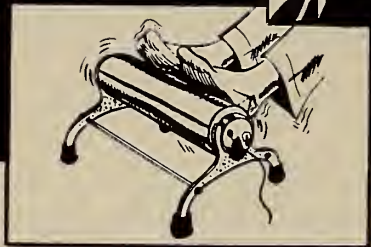
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temperature at which it is damaged in some laboratory test, valuable though this may be for other purposes. For only the "skin" of the base is heated, and only for a very short time; and, further, it would be difficult to relate "damage" as a projectionist knows it to the results of a special test.

It is the author's opinion, therefore, that there would be little value in measuring the temperature of the "skin" of the film base while in the gate, even if a method of doing it could be devised. Reliance must be placed instead on present experience, and in every case the results must be referred back to the intensity of heating of the radiation in the gate, expressed, for example, in watts per sq. cm. On this basis only can we consider how to increase the light output beyond the level at which damage now occurs.

Advantages of Filtering Light

The luminous efficiency of radiation from an arc lamp can be more than doubled by quite simple filtering. In the case of a projector which is damaging film by overheating, such a filter will almost certainly cure the trouble, while the reduction of light would be only just visible.

Better results can be obtained if the filter is incorporated when the projector is being designed. It would then be possible to double the light output before damaging the film, resulting in twice the screen brightness or, alternatively, twice the area of screen at the same brightness. It may safely be asserted that there is at present no 35-mm

projector in normal use which would damage film if only the light were well filtered.

It is common experience that Technicolor or other color film is not damaged by overheating in a mirror-arc projector which will damage black-and-white film. This is due to the fact that the dyes used for color processes are nearly transparent in the infra-red region of the spectrum. Consequently the infra-red radiation from an ordinary mirror arc passes through the dyes and the film is mainly heated by the visible light. Therefore, the radiation absorbed by the film has a high luminous efficiency, as if it had been partially filtered, and the heating effect is reduced.

Of course, the additional infra-red radiation which passes the film goes into the objective lens where it is partially absorbed, and this accounts for the additional heating of this lens experienced with the projection of color films.

Present Process Projectors

An example of the best performance obtainable now is given by a 35-mm process projector in which every part of the system is developed to its optimum condition. The arc operates at 300 amps with a 16-mm positive carbon, which gives the greatest light intensity consistent with quiet and steady burning. Any increase would result in more noise and greater unsteadiness, or would require a larger carbon with its lower surface brightness.

The optical system, incorporating the combined heat-absorbing cell and first condenser lens described earlier, accepts a large proportion of the light from the arc, and this could not be increased very greatly. A relay condenser system ensures uniform illumination over the gate and the objective lenses have an aperture of F:1.4. Any change of the optical system to give more light would probably result in non-uniform illumination over the screen or a reduction of definition, particularly since the defocus-



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ing effect of film buckling in the gate might become apparent.

Screen Light vs. Mechanics

The light output on the screen is about 50,000 lumens, and this is only a little less than the maximum amount of heat which the film will withstand, based on the curve of Fig. 3 (measured with shutter not running; intensity of radiant energy at gate 58 watts per sq. cm.; well filtered light at 190 lumens per watt). Since each part of this projector is pulling its full weight, it would be difficult to obtain any marked increase in output, although small increases could be made at the price of reduced silence, or less stability and uniformity of illumination or definition, if this could be tolerated in other applications. It is probable, however, that any increase of picture brightness could more easily be obtained by modification to the screens, by

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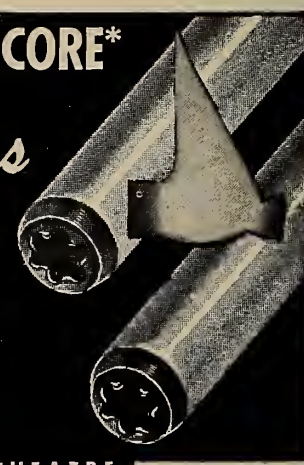
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Future Developments

Should the need ultimately arise, it is, however, possible to foresee motion picture projectors with several times as much light output as those of to-day, perhaps using a "blown-arc" or large arcs and different optical systems. Looking into the future, we may tentatively consider some of the means of preventing the additional light from damaging the film, several of them being well known. In every case, of course, it will be necessary to filter the light.

(1) Using 70-mm film would permit four times the gate, but probably only about three times as much light, since grave difficulties might be experienced with maintaining the film flat in the gate; there would also be much disturbance to printing and processing equipment.

(2) Running the film faster would give it less time in the gate, but such a step

would be virtually impossible because of the requisites of sound reproduction.

(3) Since the rise of temperature of the rear surface of the base while being exposed is less than 1/100 of that of the emulsion side, it will be quite useless to try to reduce the over-all temperature by cooling the rear surface.

(4) The maximum amount of heat which could be extracted from the emulsion side by forced air cooling is limited by the greatest air velocity which can be obtained. Even with a 300 m.p.h. blast of air on the film, only an extra 10 per cent. of light could be used. Air cooling of moving films is therefore worthless. A small air-jet may, however, have another use in blowing away the steam which is formed when the small amount of water always present in gelatine is driven out by the heat.

Film Immersed in Liquid?

(5) It might be possible to surround the gate with a cell with glass windows, filled with liquid, so that the film is immersed in the liquid while it is in the gate. Water is the best cooling medium, and a 2½ times increase of light could be obtained. Due to the poor conductivity of liquids the temperature distribution through the water would be similar to that shown in Fig. 2 through the film base, except that the heat would penetrate 1½ times as far through the water. Even so, only about 0.002 in. thickness of water is absorbing any significant amount of heat. There would be the real complication in drying the film before spooling it, even if another liquid were used.

(6) Cooling with a rapidly moving stream of liquid would be more effective. If glass plates were placed close to the film, to form narrow channels for the cooling liquid which would be pumped through at high velocity, it might be possible to obtain about a four-times increase in the light output.

(7) On several occasions a liquid has been applied to the picture area of the emulsion so that it is evaporated away while in the gate, some of the heat developed in the emulsion providing the

latent heat of evaporation instead of heating the base. Only the liquid on the emulsion side of the film assists in preventing damage to the base.

The difficulty is, the heat has to travel through the liquid layer from the emulsion to the outer surface of the liquid, where the evaporation to the air is taking place. Due to the poor thermal conductivity, not a great deal of heat is transferred, and instead of evaporating smoothly the liquid might boil off, which might appear on the screen. A high velocity blast of air might assist in preventing this. It is estimated that a two- or perhaps four-times increase of light might be obtained.

(8) Doubling the thickness of the



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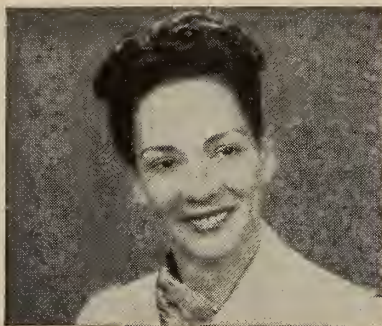
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emulsion would only permit a small increase of light, because such a small proportion of the heat is in the emulsion.

Film Base Change Unlikely

(9) Because the basic difficulty arises from the poor conductivity of the film base, some improvement would result if the thermal conductivity or thermal capacity of the base material could be significantly increased. Such a change to the base material appears most unlikely.

It may be concluded that there are several ways in which the light might be increased about four-times above the present maximum (after filtering), but each would introduce severe practical difficulties. Even by a combination of the methods at present foreseen it would hardly be possible to obtain a ten-times increase.

From Larry Davee, sales manager for Century Projector Corp., comes the following comment on the forgoing article:

The ideas expressed by Mr. Ross have considerable merit technically. It would seem, however, that the suggestions would present some difficult problems when adapted for commercial applications.

A 16-mm positive carbon crater at 300 amperes positioned $2\frac{3}{4}$ inches away from a $5\frac{1}{4}$ -inch diameter quartz window, even with the advantage of water-cooling, would seem undesirable from an operating standpoint over an extended time.

Cooling Literature Growing

Century has been giving careful thought to water-cooling devices similar to those suggested in Mr. Ross' article, and we believe that there are possibilities for their eventual adoption. In each case,

however, the loss of light occasioned by such devices outweigh any advantages which cannot be obtained by other means.

A number of the ideas expressed in the article would seem to be a recap of information already published, with particular application to the work of Dr. F. J. Kolb*, of Eastman Kodak Co., whose studies have contributed much to the thinking of many engineers who are concerned with the problem of obtaining more light on the motion picture screen within the limitations of the film.

Some of the statements made by Mr. Ross are, I think, contradictory as to heat absorption by dyed images on the film. I doubt also the contribution of heat from the visible part of the spectrum.

Water-Cooling On Way Up

The interesting disclosure in the Ross paper is not particularly the results obtained with water cells but the fact that it is becoming more and more apparent that water or other liquid cooling is definitely on the way and will be adopted by more and more manufacturers as projectionists become increasingly aware of its advantages. Usually one test by a projectionist means another supporter for water-cooled equipment.

Our experience with Century water-cooled apertures has proven beyond a doubt that wherever Super-Hi or High-Intensity arc lamps are used, water-cool-

*"Air-Cooling of Motion Picture Film for Higher Screen Illumination," by F. J. Kolb; IP for Jan., Feb. and March, 1950.

ing is a "must." We believe that the use of any carbon arc pulling 65 amperes or more requires some cooling device more effective than air circulation or air jets.

From Charley Hahn, president of J. E. McAuley Mfg. Co., comes the following comment:

I found the article by Mr. Ross tremendously interesting. My own opinion is that it is the first wholly conscientious effort to determine scientifically what actually happens to the film due to the thermal impact of light-heat at the projector aperture. However, as for the means cited for filtering and water-cooling same, at a location between the arc crater and the rear condenser, I must reserve approval until I see such a setup in operation, so designed that it would be practical enough to be used for theater projection.

I might mention in passing that to date I have neither seen in actual operation nor noticed mentioned in the literature any system which would impel me to change in any major respect the opinions I expressed in the symposium on this subject which you published last year.*

*"Cooling Means for H-I Arc Projection"—A Symposium; IP for September, 1949, p. 22.

Additional Recent Literature:

"High-Brightness Carbon Arcs," by M. T. Jones and F. T. Bowditch; IP for July, 1949, p. 12.

"The Effect of Carbon Cooling on High-Current Arcs," by Wolfgang Finkelnburg; IP for June, 1949, p. 14.

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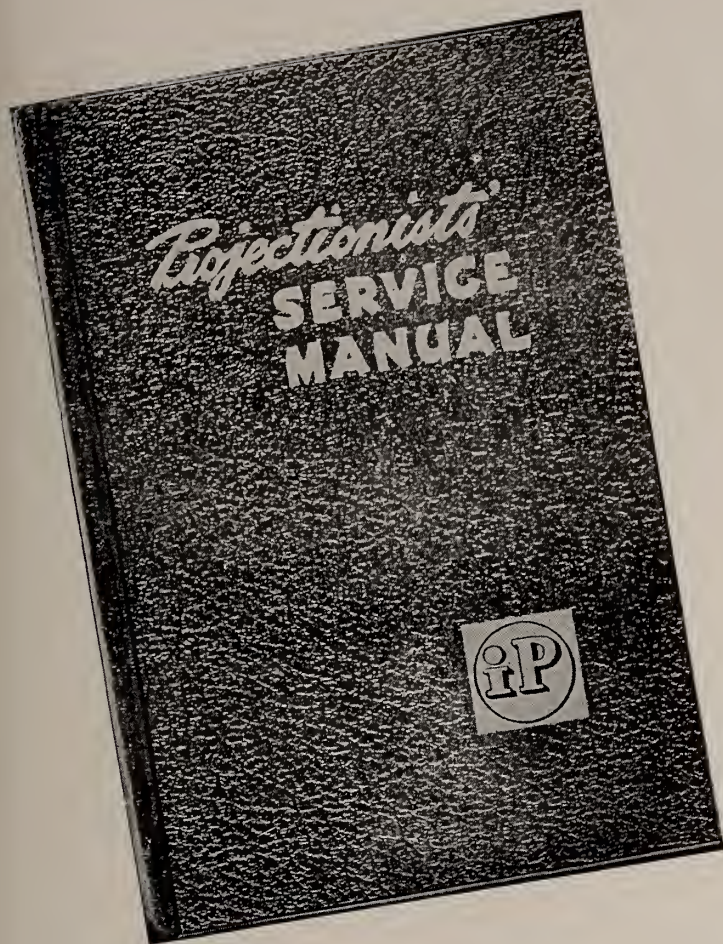
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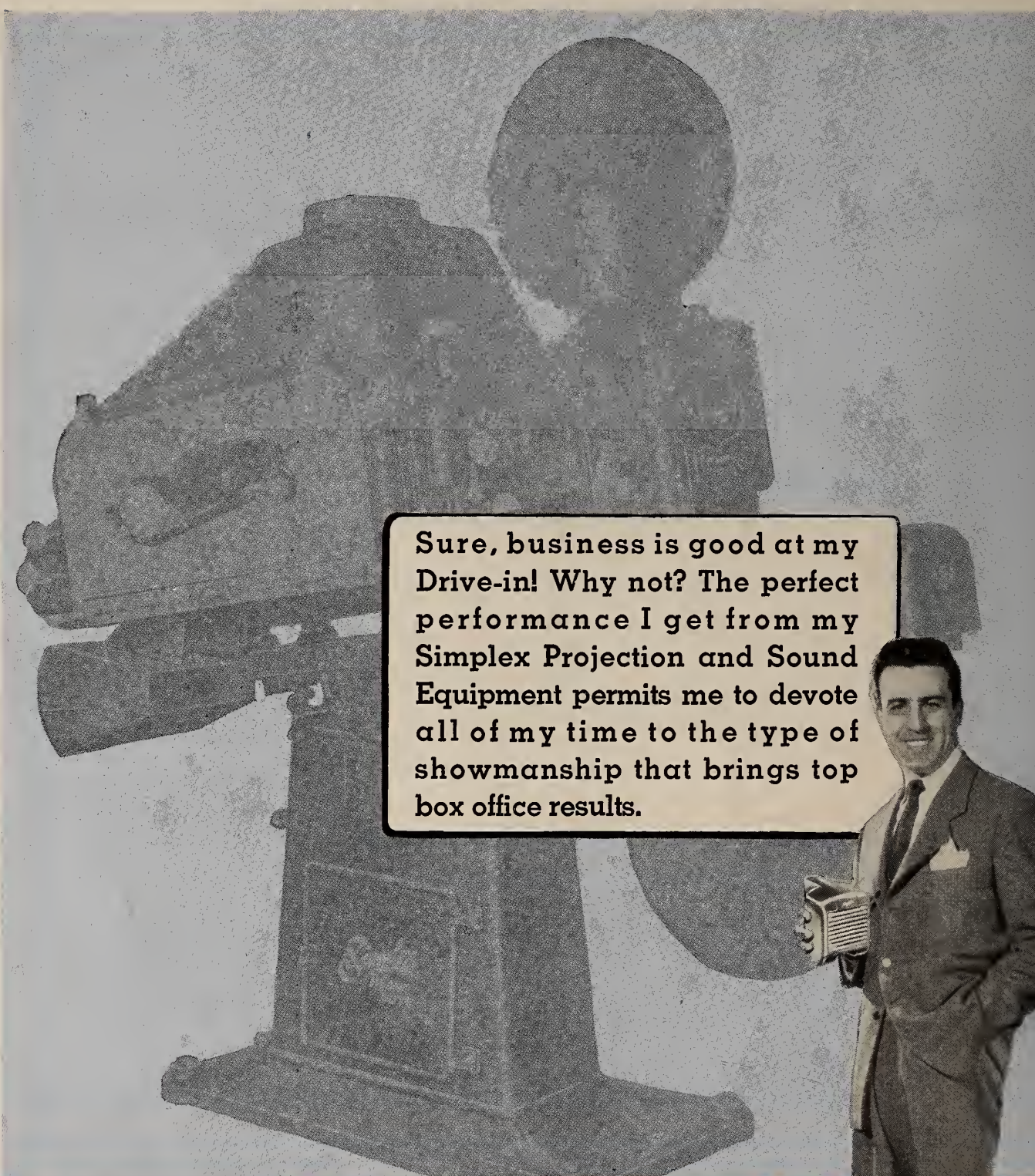
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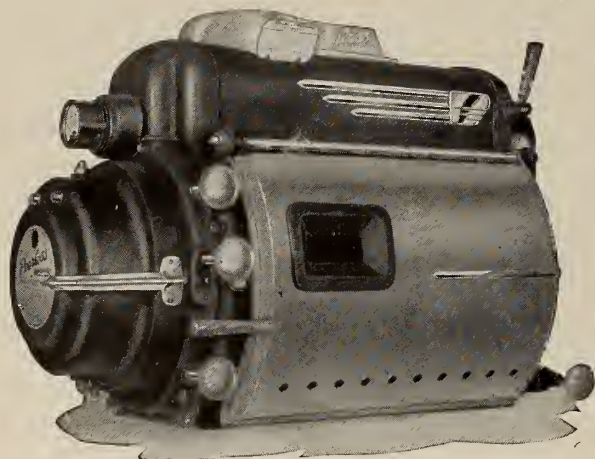
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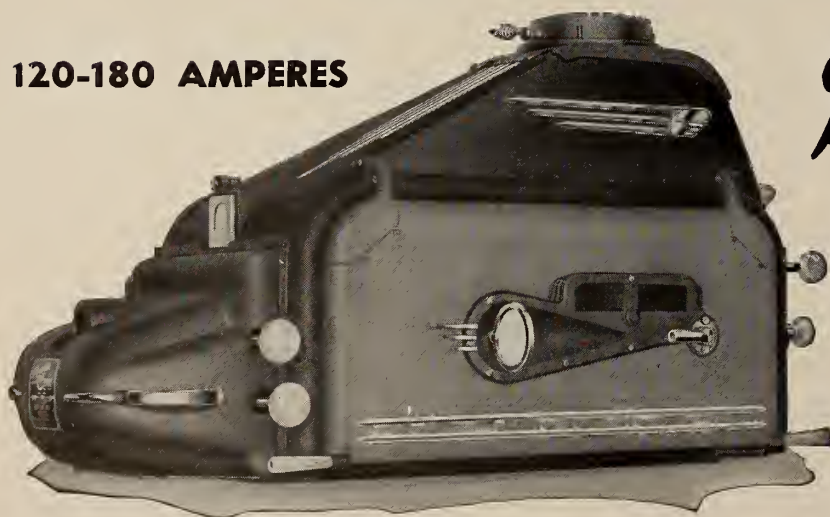
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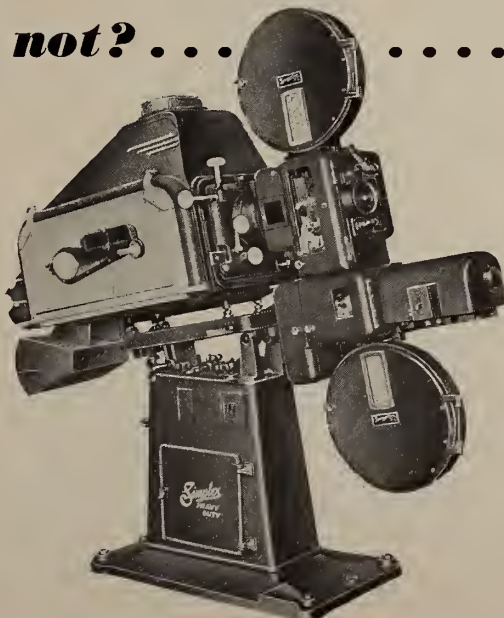
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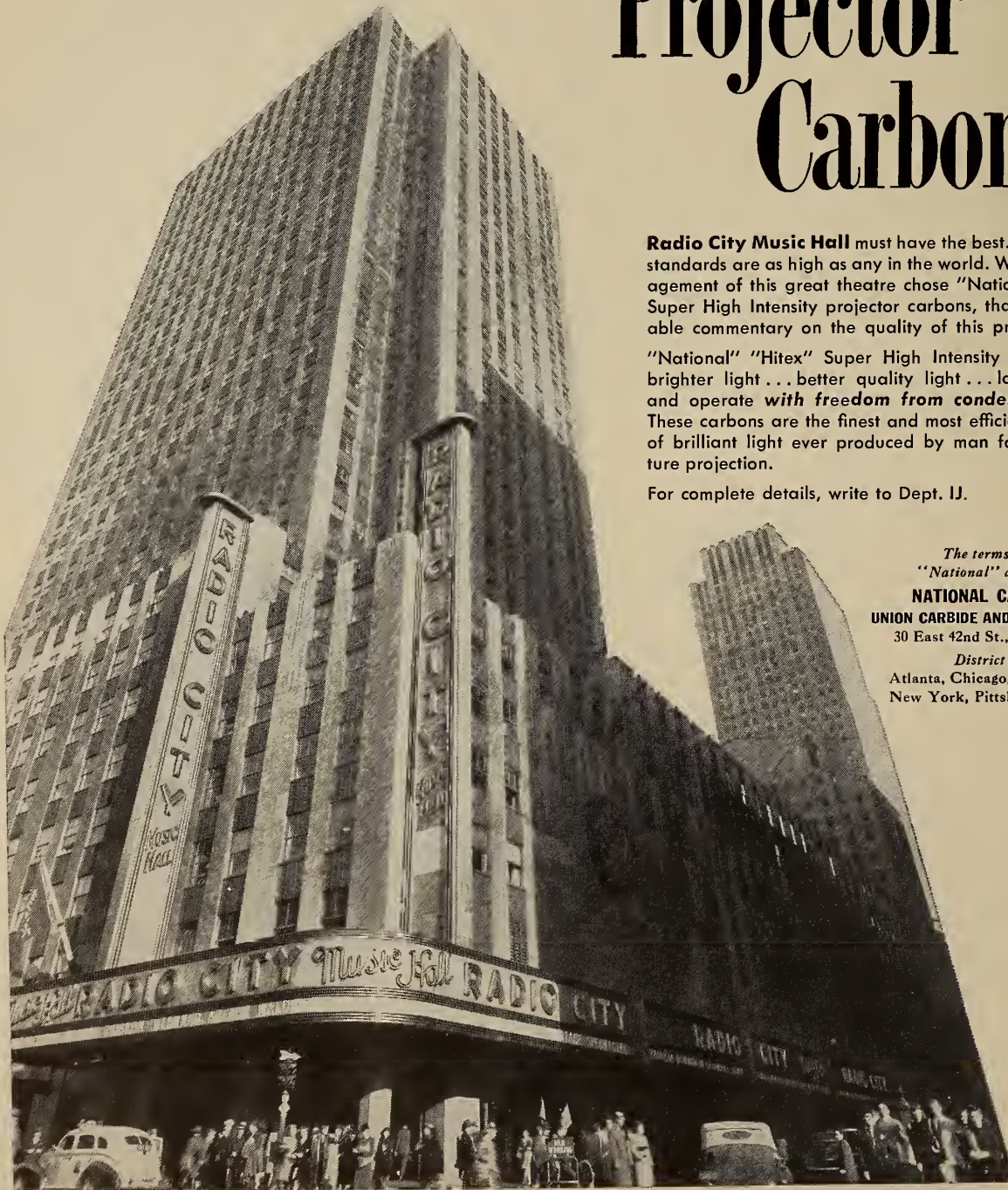
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INTERNATIONAL PROJECTIONIST

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HENRY B. SELLWOOD, *Editor*

Volume 25

JUNE 1950

Number 6

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MONTHLY CHAT

EVERYBODY in the film industry is aware of the sensational gains scored in the production and exhibition ends of the 16-mm field, but only those close to the design and manufacture of such units are aware of the tremendous technical advances incorporated in current 16-mm equipment.

Until 1947 sound reproduction via 16-mm film left much to be desired, but today sound quality is so good that it requires an expert to detect any difference between 16-mm and 35-mm reproduction; while on the visual side there can be no doubt that 16-mm film could be used effectively in many small theaters—if product were available.

Pointing up these widespread advances on the 16-mm front is the article appearing on page 26 of this issue which sets forth U. S. Navy specs for 16-mm equipment. Reading this article is bound to engender a new and higher respect for these units.

Included in this article is the statement that high-intensity carbon arcs are unsuitable for 16-mm color print projection because such subjects were produced by "inkie" lighting. IP disagrees—emphatically. About 12 years ago National Carbon introduced the "Pearlex" carbon trim specially designed for 16-mm projection. The use of this trim in appropriate lamps produced 4 to 5 times as much light as "inkie" projectors. "Pearlex" carbons produce more red and yellow radiation than the carbons used for 35-mm projection and thus satisfy every requirement for the projection of 16-mm color prints, irrespective of what process is used in production.

Further recent advances in the design of carbon arc projection equipment offer additional illumination output. A case in point is the new professional 16-mm projector announced by Eastman Kodak which employs a more powerful carbon arc and provides twice the light output of the "Pearlex" carbons.

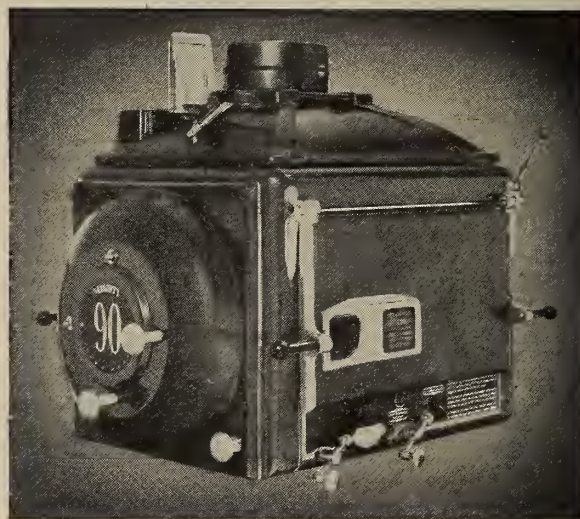
Mentioned only in passing herein has been the effective coverage of a large screen area, since it is obvious that in this respect carbon arc projection of 16-mm film, whether in black-and-white or color, admits of no competition. The point stressed herein is that carbon arcs now are and have been for many years wholly satisfactory for the projection of all types of 16-mm prints.

The quality of 16-mm film today merits serious consideration by all elements of the organized craft. This interest should extend to the point where within every local unit there are several men who not only have mastered operating technique but also know the design and construction of every component so as to be able to strip down an equipment and service it competently.

STRONG STRONGEST

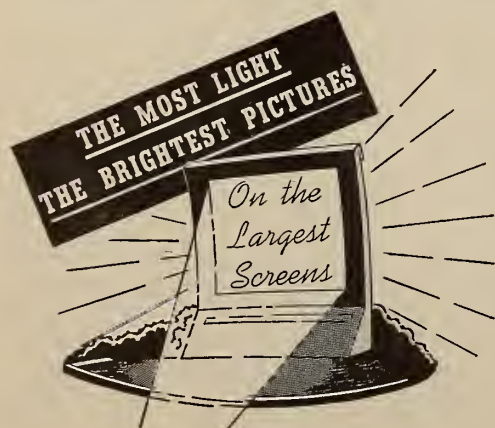


Animal men are agreed that the elephant is the strongest of all animals and feel that it, rather than the lion, should be called the "king of beasts". Since earliest times, elephants have been trained for service. In their tasks they show adaptability, intelligence and understanding. They can carry about a ton's weight at the rate of four miles an hour. With their powerful trunks, which are provided with nearly 40,000 very strong muscles, they can encircle the waist of a man and hurl him to the earth with such force as to kill him instantly. Elephants grow from 8 to 11 feet high and weigh from 4,000 to 10,000 pounds.



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Notes on Modern Projector Design

COMPARISON of the shutter design of the newest projectors made here and abroad with their manufacturers' enthusiastic claims of vastly increased light transmission furnishes the critical projectionist with plenty of food for thought. There are eight different shutter rigs in use, not including flash illumination from discharge lamps used in certain types of television film projectors. With the exception of the combination rear-and-front shutter and the double-rotor cylindrical type, all were known in the days of silent pictures.

The purpose of the occulting ("hiding") shutter is to cut off the screen illumination while the film moves in the gate, and again, and for an equal interval of time, in the middle of the "rest" period to eliminate low-frequency flicker. The quickest possible cutoff is desirable because it permits the shutter blades to be made narrower: the narrower the blades, the brighter the picture. (Narrowing the blades also slightly decreases apparent flicker from the action of the shutter, but this advantage has been greatly overestimated.)

With a 3-to-1 intermittent movement, the shutter *theoretically* permits *exactly* 50 per cent of the total illumination to reach the screen when the shutter is adjusted for the most efficient operation (25 per cent of the light is lost during the "master" cutoff, and another 25 per cent during the "balancing" cutoff.) This assumes an *instantaneous* cutoff the moment the pin of the cam just begins to enter the slot of the Geneva star-wheel, and also an *instantaneous* opening the

By ROBERT A. MITCHELL

II

moment the pin actually leaves the star-wheel slot. But in practice several other factors come into the picture.

In the first place, the Geneva intermittent movement starts and stops so very gradually that the shutter blades can (theoretically) be narrowed down to allow 55 per cent of the light to pass without introducing undesirable effects.

Two other factors, however, largely cancel this gain. The light-beam to be "cut" has an appreciable diameter. The shutter has a limited size and a rather low rotational speed. These two factors combine to make the cutoff gradual, rather than instantaneous. This state of affairs necessitates wider shutter blades and a greater loss of light if a high-quality picture is desired.

In most of the older theater projectors a front shutter of only moderate size was customary. This type of shutter was

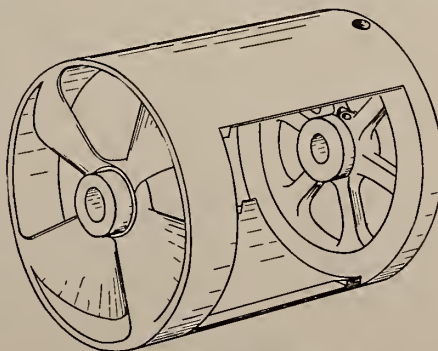
fairly efficient, but, of course, it could not reduce the heat of the arc-lamp beam in the gate. The shutter shaft extended out in front of the mechanism sufficiently far to permit the shutter-disc to be positioned in the plane of the "aerial image"—a reduced image of the lamphouse condenser or mirror. At that particular point the light-beam has its smallest diameter, and hence the cutoff is the most rapid, enabling the narrowest blade-width to be used to advantage.

From 40 to 50 per cent of the light is transmitted by a properly adjusted front shutter of the old type. (Important exception: the now obsolete Powers projector, soon to be considered.)

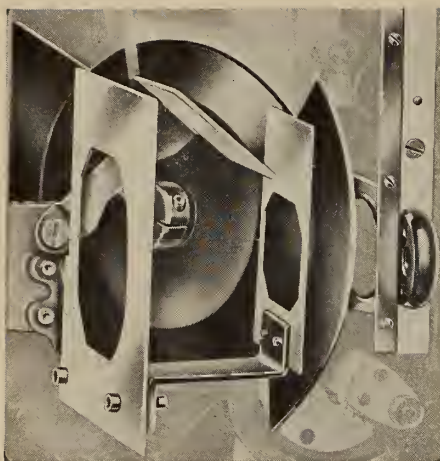
Disc-Type Shutters

A disc-type rear shutter, in order to be equally efficient, must be made somewhat larger in diameter than a front shutter. The beam of light which the blades must intercept increases in diameter as the position of the shutter is moved away from the aperture toward the lamphouse. Then, too, the size and distance of the mirror or condensing lens influence the diameter of the beam at all points between the lamp and the aperture. A single disc-type rear shutter of the usual size, and located about 5 inches from the aperture, transmits from 40 to 45 per cent of the total projection illumination.

In order to provide the very sharpest cutoff with the rear shutter, the Simplex E-7 employs a combination of two shutters, rear and front, each cutting opposite sides of the light beam, even though both are mounted on the same shaft and



Motigraph barrel-type shutter



The Simplex X-L projector utilizes a single-unit conical shutter built-in only $1\frac{1}{8}$ inch fram aperture at narrowest point of light beam, affording an ultra-sharp cutoff and maximum light transmission, with fewer parts, less gearing and quieter operation.

turn in the same direction. The combination rear-and-front shutter can be adjusted to transmit about 50 per cent of the light without the appearance of bad effects in the projected picture.

The reduction of heat in the aperture and gate of the mechanism by the use of rear shutters is so desirable that some of the earliest projectors (several built before 1900) were fitted with them. In Europe the cylindrical, or barrel-type, rear shutter enjoys the widest use. In this country the simple barrel shutter can be seen in the older models of the Motiograph projector.

The modern Motiograph AA employs an ingenious modification of the cylindrical shutter. Two "rotors" having narrow blades revolve in opposite directions on the same axis of rotation—a manifest improvement over all other types of cylindrical shutter.

The Conical ('Dished') Shutter

The so-called "dished," or conical, shutter represents a distinct advance in shutter design, but there is nothing new about it. It is described and pictured in prewar European projection textbooks, but it has only recently been adopted by well-known projector manufacturers. The British (claiming the idea to be original!) first made use of it in the B.T.H. SUPA and in the SUPA Mark II. And shortly afterwards the conical shutter happily attained materialization in the Simplex X-L.

The shaft of the conical shutter lies at an angle of about 45 degrees to the optical axis of the projector. The cutoff action approaches that of the cylindrical shutter in its almost parallel cutoff, or sweep, over the aperture area. Unlike the disc shutter, the conical type operates very close to the aperture plane without getting in the way of anything—about 1

inch from the aperture in both the SUPA models and the Simplex X-L—hence a very sharp cutoff.

The percentage of light transmission of this shutter is approximately 55 per cent, the maximum permissible with a 3-to-1 Geneva intermittent without introducing effects which would mar the quality of the picture.

Narrowing Shutter Blades

Projectionists are well acquainted with the undesirable effects which are produced by narrowing the shutter blades beyond the permissible minimum. If the shutter is partially open after the intermittent sprocket starts to move, or before it comes to rest, the edges of all bright objects in the projected picture will tremble, or flutter, very rapidly. This shivery effect, known as "scintillation," is easily visible from the first few rows of seats nearest the screen, even if it can't always be seen from the projection room without using field glasses or binoculars.

And if the shutter blades are reduced in width still more, both "up" and "down" travel-ghost will appear. Both scintillation and travel-ghost become more noticeable as picture brightness is increased.

This writer has always looked to powerful lamps, "fast" lenses, and snow-white screens for satisfactory picture brightness—not to shutter blades reduced in width beyond the permissible minimum. In those theaters where high-quality projection counts, not even a trace of scintillation tremble can be tolerated. For this reason I have in the past recommended strongly that shutter blades be just a trifle wider than is absolutely necessary. The amount of light actually lost by this important safeguard of picture quality is negligible.

Regardless of how "clean" the picture looks from the projection room, the projectionist knows that the folks down in the front row can see (and be annoyed by) defects that are invisible at a greater distance from the screen.

Salesmen's efforts to drum up enthusiasm for "new" shutters on the basis of "vastly" increased light transmission or "greatly" reduced shutter flicker must be judged on the basis of the facts at hand. No projectionist worthy of the name will allow himself to be fooled by mere adjectives and adverbs.

Now, the percentage of light-transmission of any shutter is easily ascertained by taking photometric readings at the screen, dividing the number of footcandles with the machine running (without film) by the number of footcandles without the shutter running, and multiplying the quotient by 100. It may be said that an increase in screen illumination of 5 per cent is barely noticeable; that an increase of 10 per cent is readily perceivable, and that an increase of 15

or 20 per cent is quite noticeable, and an improvement.

Intermittent Controlling Factor

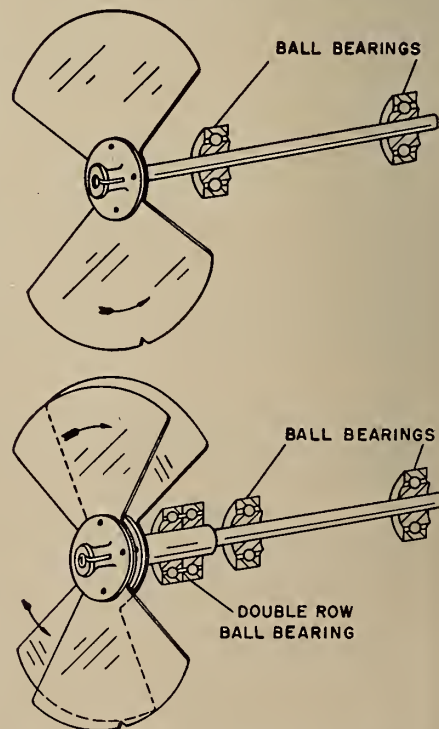
It would seem that the ultimate in shutter efficiency has been reached in modern projectors. *The only possible way to make still narrower shutter blades practicable is to increase the speed of the intermittent movement.* The greater the "speed" of the intermittent, the more rapid the pull-downs and the longer the periods of rest.

The quest for worthwhile innovations in projector design has unfortunately left the intermittent movement, save for minor refinements, untouched. Why not a 5-to-1, instead of the usual 3-to-1, movement? Would such a movement be rough in action or wear out film rapidly?

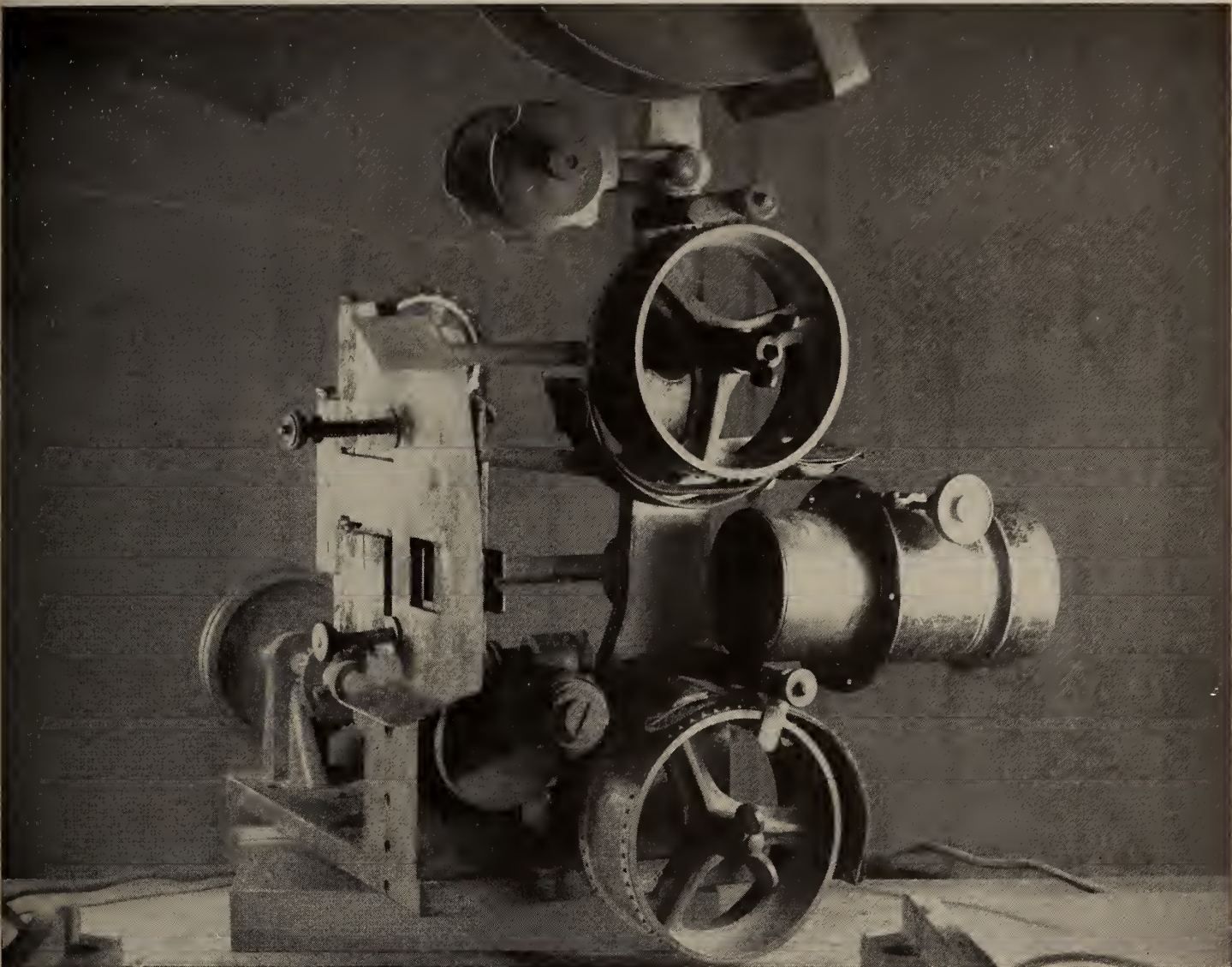
To call a 5-to-1 movement an "innovation," however, would be an error of statement. There is nothing new about such movements. One, in particular, has been widely used in the past and proved its worth—the pin-cross and cam-ring intermittent of the Powers projector. (Although obsolete, the old Powers machine is still doing service in numerous theaters.)

The 5-to-1 pin-cross movement was silent, smooth, and accurate. It was not noticeably rougher on film than the 3-to-1 movement; but the pin-cross, itself, wore rather rapidly and had to be replaced at more or less frequent intervals to in-

CENTURY PROJECTOR SHUTTER TYPES



Single shutter (top) has a normal commercial width of 90° and a maximum light width of 82°. Double rear shutter (bottom) has a normal commercial width for each blade of 68° and a maximum light width for each blade of 57°.



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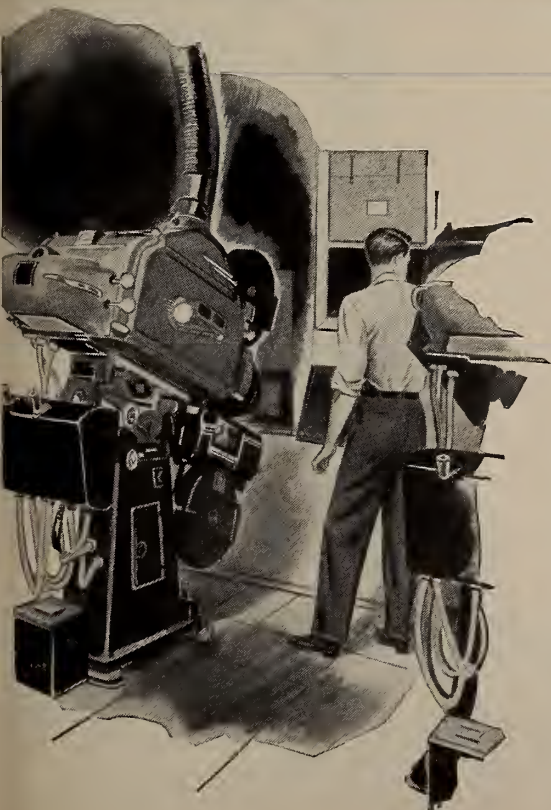
handling of elaborate equipment . . . the film illusion owes much of its dramatic, realistic presentation on the screen.

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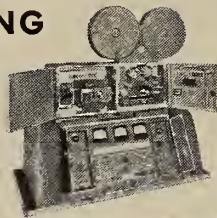
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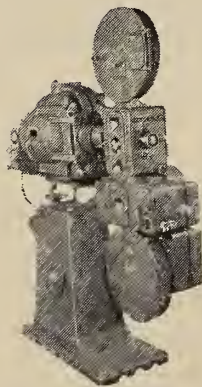
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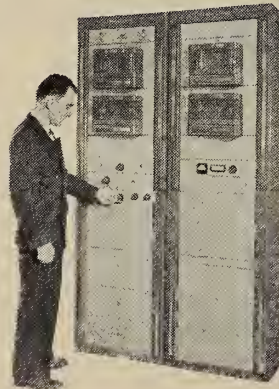
Westrex Theatre Sound Systems

SOUND AND PROJECTION SYSTEMS



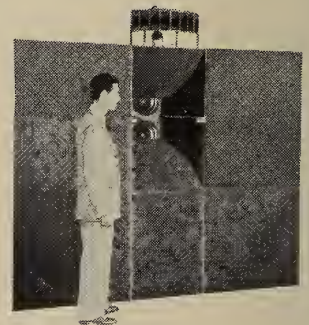
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sure perfectly rock-steady pictures—a difficult feat in the Powers because of the primitive construction of the film gate. Wear in the pins, or rollers, manifested itself in a rapid jiggling of the picture image. Acceleration of the sprocket was very gradual, as in the Geneva movement.

Suggested Movement Modification

There is no doubt that a modern modification of the pin-cross movement made of the best alloy steels would compare favorably with the very finest Geneva movements. But 5-to-1 movements need not be confined to the pin-cross principle. A 5-to-1 Geneva movement having a 3-sided star and a 12-tooth sprocket has an acceleration and deceleration identical with the present-day 3-to-1 Geneva movement having a 4-sided star and a 16-tooth sprocket.

Such a 5-to-1 Geneva movement does not start with a “bang,” nor should it damage film perforations excessively. Normal film wear could be expected. The movement, itself, would require the same tolerances in manufacture as present Geneva movements, but it might have

to be more massive to conserve the cam pin.

The advantages of 5-to-1 movements are obvious. By using conical shutters with them, the shutter blades can be narrowed to pass approximately 65 per cent of the total illumination. Even the old-style front shutter of the Powers could be trimmed to pass 55 per cent of the light without the appearance of travel-ghost.

More important than increased light, however, is the opportunity presented by 5-to-1 movements to eliminate completely the shutter flicker visible in brightly illuminated motion pictures. This is accomplished by employing a 3-bladed shutter in place of the conventional 2-bladed shutter, thus stepping up the frequency of light-interruption from 48 to 72 per second.

By using a 3-bladed conical shutter, a light transmission of nearly 50 per cent could be obtained, *but by using a single-bladed conical shutter revolving three times as fast, transmission could be increased to 55 per cent!*

[To be Continued]

Film Runs at 90 ft. per Minute—Wanna Bet?

SO MANY factors enter into the projection process, and so precise must be the equipment which makes possible the mechanical miracle of projecting a well-lighted, steady image on a screen more than 100 feet distant, that even the best informed and thoroughly seasoned projectionists are likely to slip up on some phase of the art. Particularly is this true when a discussion centers upon so intricate a mechanical assembly as the intermittent movement, rightly termed the “heart” of the projector.

Apropos the foregoing is the comment induced by the publication herein recently of an article on the intermittent movement.* The paragraph in this article which occasioned much eyebrow-lifting

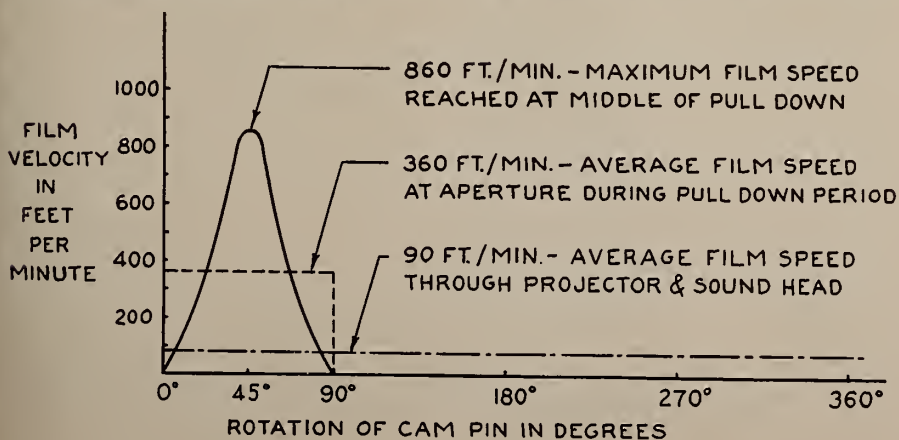
* “The Geneva Intermittent Movement,” by A. C. Schroeder; IP for March, 1950, p. 7.

and no little comment is reproduced here:

“When moving at a uniform speed (as it does on the upper sprocket) each frame (of film) is in motion four times as long as it is when in motion at the aperture. The average speed at the aperture is four times normal, or 360 feet per minute. Due to inertia, the film, the sprocket and the intermittent shaft must be brought up to this speed gradually, consequently the maximum speed must exceed 360.”

A Thousand Words—One Picture

“Not so!” chorused a score of comments received via the mails; and “Not so!” echoed the cry from several visitors to IP’s office. Oral explanation, even when buttressed by rough sketches, failing to convince these skeptics that Mr.



Schroeder was correct (and our patience finally wearing a little thin) we decided to go to the fountainhead of projector knowledge, a projector manufacturer, and have prepared irrefutable graphic evidence of just what happens during the passage of film through the aperture zone.

We invite the attention of the doubting Thomases to the accompanying drawing, prepared for IP by General Precision Laboratory (research center for the Simplex factory and other GPC affiliates) which not only proves Mr. Schroeder to have been correct but also provides data which may be news not only to him but to other highly competent technicians.

This drawing is inclusive and wholly self-explanatory, and it is well that this is so, because any extended comment thereon would run counter to our good intention of rubbing nothing but soothing salve on faces which are already a deep red hue.

Heat, Light Reflectivity Is Upped by Kodak Mirror

A better method of transmitting heat in high-intensity motion picture projectors is promised by a new development of Eastman Kodak Co. It is a process for coating an arc mirror with multiple-layer interference films instead of silver. The coatings reflect most of the light but transmit nearly all of the heat.

Over-heating and buckling of motion picture film, especially when 16-mm film is projected with arclamp light, has been a problem for design engineers. Heat-absorbing glass placed between the light source and the film often became so hot it cracked. The present coatings which consist of layers of transparent material having alternately high and low refractive index.

Kodak scientists have found that by adjusting the thickness of the layers so that visible light is reflected from each layer “in step” with the light reflected from others, the combination produces high reflection. Wavelengths outside the visible region are reflected “out of step” and pass through the mirror. Thus there is high transmission of heat.

The coating technique involves evaporating the required number of layers, one after the other, onto a glass mirror blank as it rotates in a high-vacuum chamber. Thickness of each layer is controlled photoelectrically. Adjusting the thickness of the layers also brings better control of the color quality of the reflected light, an important point in projection of color movie film.

X-ray movies showing how water passes down a man’s throat when drinking are a feature of the medical science exhibit in the hall of modern photography at George Eastman House in Rochester, N. Y. By way of contrast, one of the earliest Kodak cameras sold in 1888 also is on display.

THE mention of gaseous conduction reminds most people of the phenomena that takes place when a specified voltage is applied across the extremities of a gas-filled tube, causing the emission of light. This type of application, of course, has found wide use in advertising, but it is only one of numerous uses of gaseous conduction fundamentals.

We find use of these principles in almost all walks of life today, the one of paramount interest in this discussion, though, being those found in the projection room.

There are at least four forms of electrical conduction in gases that may be found in the projection room; these are: carbon arcs, tungal rectifiers, voltage regulator tubes, and neon service lamps. The first two forms represent what is known as an *arc discharge*, while the latter two are recognized as *glow discharge*, giving us the two general classifications of gaseous electrical discharges.

Although the glow discharge will be given primary consideration in this text, it might be well to mention that there are only two primary differences between an arc and a glow discharge. These differences are found in current density and voltage drop.

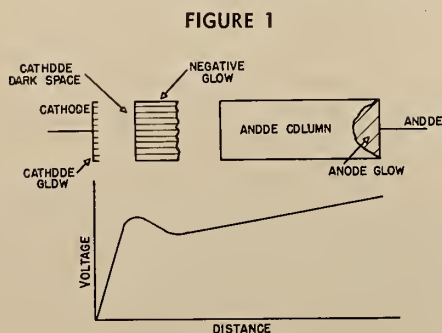
If we define ionization potential as the least amount of energy necessary to remove an electron from an atom or a molecule, then it can be said that an arc is characterized by a high current density and a voltage drop in the same range as the ionization potential.

Glow, Discharge Characteristics

A glow discharge, on the other hand, is characterized by a very low current density and a high voltage drop. The manner of voltage distribution across a glow discharge is interesting and may be observed in Fig. 1, along with a diagram illustrating the physical aspects of a glow discharge.

Physically, a glow discharge is not at all a continuous glow from one electrode to another as is sometimes believed. It is made up of a number of individual regions that are shown in Fig. 1. This diagram is made on the assumption that the gas pressure is around two millimeters of mercury or less and that the anode and cathode plates are flat and parallel.

Next to the cathode there is a region



Gaseous Conduction

By M. D. BOATRIGHT

termed the *cathode dark space*. Observation of the region indicates a constantly increasing brightness as it approaches the cathode. Adjacent to the cathode this terminates in a relatively brilliant area known as the *cathode glow*¹. In the direction of the positive electrode the cathode dark space ends quite abruptly at the beginning point of a luminous portion known as the *negative glow*.

The luminosity of this region gradually diminishes into another dark space known as the *Faraday dark space*, which, just as the cathode dark space, has a very abrupt ending. Immediately following is a region known as the *anode column*. This column extends from the Faraday dark space all the way to the anode, encompassing a section identified as the *anode glow*, a luminous layer covering the surface of the positive electrode.

The foregoing description should give a fairly concise picture of a glow discharge, along with the terminology usually attached to its various regions.

One should not be misled, though, into attaching the particular arrangement shown in Fig. 1 to all glow discharges. As a matter of fact, it is possible to have an arrangement in which the cathode dark space fills practically the entire space between plates. It has been found that the relative size of the various regions is controlled principally by only two factors—pressure and electrode spacing.

Pressure, Plate Spacing

If the discharge represented in Fig. 1 is considered under changes in pressure or plate spacing, a number of things may be observed. If the pressure is decreased and the spacing is maintained constant, the effect is that of increasing the size of the cathode dark space. Since additional room must be made for this increase in size, the negative glow, Faraday dark space, and anode column are moved toward the anode and appear to disappear within the anode as the pressure is lowered.

At very low pressures, these three regions will have completely disappeared,

¹ Theory and Application of Electron Tubes. H. J. Reich, p. 419.

the cathode dark space filling the entire space between electrodes. In such a case, cathode rays (or high velocity electrons) will cause the walls of the tube to fluoresce as they release their energy upon impact.

If, on the other hand, the pressure is maintained constant and the electrode spacing is diminished, the various portions of the discharge remain fixed relative to the cathode, while the anode column again appears to have moved into the anode. This is, of course, the same sort of change that occurred when the pressure was lowered, so a general conclusion may be drawn, *i.e.*, a decrease in pressure or electrode spacing in a glow discharge tube is accompanied by a corresponding increase in the cathode dark space.

With these basic physical concepts in mind, it is interesting to note the relationship between the amount of current passed through the discharge and the applied voltage. Knowledge of this relation is very important in that it forms a basis for practical application of the glow discharge.

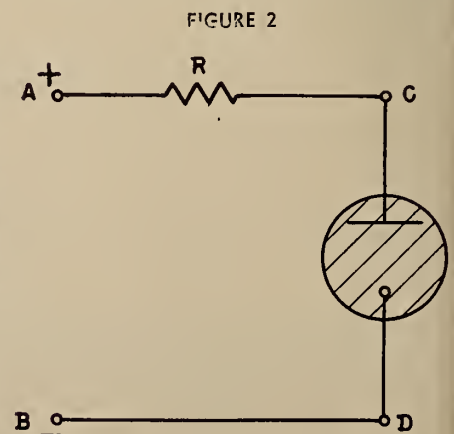
Current-Voltage Relationship

The basic circuit for use of a glow discharge tube is shown in Fig. 2 wherein there is a d-c supply voltage, a limiting resistor *R*, and a glow tube. The current-voltage relationship of the glow tube is shown in Fig. 3 and requires a few words of explanation.

If a progressively increasing d-c voltage is applied between terminals *A* and *B* (Fig. 2) the current increase at first is very small. This is caused by a passage of "left-over" or residual ions and constitutes a current in the neighborhood of one microampere.

From point 1 with an increase in voltage, the current does not increase further until point 2 is reached. Any voltage increase beyond 2 causes the current to rise to 3, a point known as the *threshold current*. The corresponding voltage point is known as the *breakdown voltage*.

As soon as the gas breaks down or



ionizes, the excitation causes a visible radiation due to the return of the gas molecules to a lower energy level. This visible radiation is recognized by most people as the characteristic glow that is associated with neon indicators and voltage regulator tubes. If there is an external resistance R , as shown in Fig. 1, there is an abrupt voltage decrease from 3 to 4 when ionization takes place due to the voltage drop in this resistance.

It should be noted here that a large change in current past point 4 is accompanied by very little change in voltage. It is this characteristic that makes a glow discharge useful as a voltage regulator.

In practice, point 5 may correspond to a current value of 40 milliamperes or more. To produce a current beyond this point it is necessary to raise the voltage to a much higher value. If the current is increased to point 6, sufficient current flows to heat the cathode, causing an emission of electrons. With an increase in electron emission there is an increase in current flow. This causes an even greater emission of electrons and the effect is additive.

Under these conditions there is no longer a glow discharge since there is a high current density and a low voltage drop. As mentioned previously, these characteristics are peculiar to an arc and are represented by point 7 on the curve. Glow discharge tubes are not designed to operate in this region, and consequently if allowed to reach such a point will very quickly destroy themselves.

Paschen's Law

One of the most interesting of the fundamentals concerned with glow discharges is that of Paschen's Law. It was Paschen who discovered that ignition voltage was related in a certain manner to the product of the pressure and the distance between electrodes. Fig. 4 is a

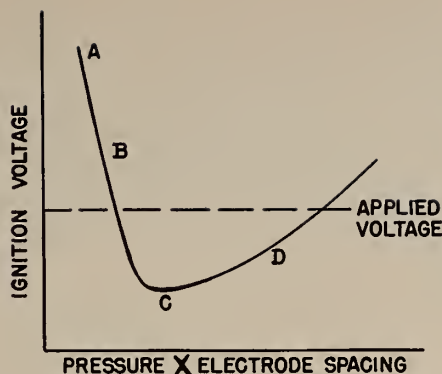


FIGURE 4

graphical representation of this law applied to parallel plates. From this curve, several interesting facts are evident.

First, it is seen that by lowering the pressure or the electrode spacing, the product of the two decreases can be lowered to a point, say A , where the ignition potential will be very high. On the other hand, if the lowest possible ignition voltage is desired, this may be achieved by a number of combinations of p and d to produce a pd product corresponding to point C .

One of the most unique features concerning the ionization potential is the fact that ignition does not always take place between the closest points. Suppose, for example, that two parallel plates are so spaced in a given pressure that the product of pressure and distance correspond to a point B in Fig. 4. With an applied voltage less than the required ignition voltage, there is, of course, no discharge.

Now consider the distance from the

back of one of the plates to the back of the other. This distance times the pressure may correspond to a pd product such as point D . This point has an ignition potential below the value of applied voltage and represents a glow discharge condition. It is readily seen from this illustration that by proper spacing and gas pressure a gaseous discharge may be made to occur between the extreme points of two electrodes rather than the closest points.

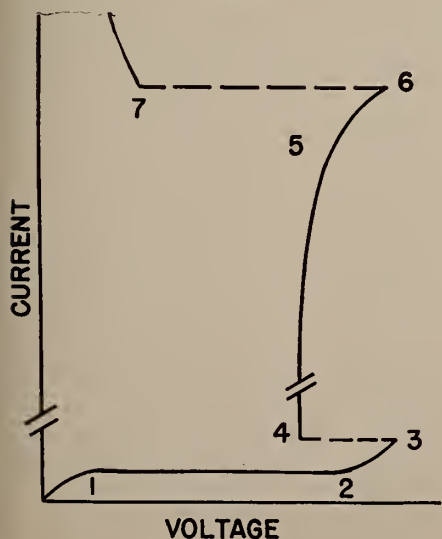
Voltage Regulator Types

Application of these principles to glow tube construction has led to a series of commercially available voltage regulator tubes ranging in ignition potential from approximately 67 volts (common to most neon type indicator lamps, sometimes used to regulate very light loads) to a comparatively new tube that operates at 900 volts. This tube was specially developed for use with radioactivity detectors where a consistent voltage and battery replacement economics were of prime importance.

The three most common types of voltage regulators with which the projectionist is most likely to be acquainted are the VR 75, VR 105, and VR 150. These tubes are used in a wide variety of electronic equipment not only by themselves but also in series multiples. If a 300-volt regulated voltage were the requirement for example, two VR 150 tubes would be operated in series.

The application of the tube is no more complicated than what appears in Fig. 2. The voltage to be regulated is applied between terminals A and B , while the regulated voltage is derived from points

FIGURE 3



Projectionist Examination Questions

Based on Examination by Leading U. S. Municipalities

61. On certain rear shutter projectors, what should be done if the air currents disturb the arc?
62. Why is the neutral wire of a three-wire system grounded?
63. Why does the power company prohibit fuses in the neutral wire?
64. What is meant by the resistance of a wire?
65. What is meant by the "negative" wire on d-c?
66. What is meant by the term "open circuit"?
67. What is the neutral wire of a 110-220 volt circuit?
68. What is meant by the safe carrying capacity of a wire?
69. Define the term "electrical conductor."
70. With tight connections and good insulators, what will cause a wire to overheat?
71. In what position should a switch be placed and pulled to open a circuit?
72. How would you determine the voltage on a line?
73. What protection is required for the use of knife switches?
74. Should wires have terminal lugs where they are connected to switches? Why?
75. Why should all connections be kept clear and tight?
76. Describe a method of making a splice in a wire.
77. Why are some starting switches on motor generators and larger equipment enclosed in oil?
78. What is a "live wire"?
79. What is meant by the term "closed circuit"?
80. Why are "floating" carbon clamps used on Suprex-type lamps?

C and D, directly across the tube. For those who have never before set up a VR circuit, the following outline may be of some value.

- A. Select a voltage regulator that will operate at the required voltage.
- B. Check the d-c supply voltage to insure that it will be sufficient to cause the tube to fire (a voltage slightly higher than the normal operating potential). A voltage considerably in excess of the operating value is usually desirable for better regulation.
- C. Connect the tube and its *minimum* load through a high resistance *R* and measure the current through the tube only. The value of *R* should be reduced until approximately 35 milliamperes are flowing through the tube (35 ma. for VR 105 and VR 150; 27 ma. for VR 75).
- D. Measure the tube current next with a *maximum* load. Should the value of tube current fall below 5 milliamperes, it is advisable to use some other form of regulation, since the load changes exceed those allowable for the VR 75, VR 105, and VR 150.
- E. Excessive current through the tube during warm-up time of the load should be disregarded if the above procedure has been followed, provided that the period before the load is applied does not exceed approximately 15 seconds.

In one sense of the word, a regulator tube acts like a current source in an effort to defy Ohm's Law. As already illustrated, an increase in load causes a decrease in tube current with virtually no effect on the voltage. Ordinarily, it would be expected that the more current that is drawn by the load, the more IR drop in the resistance *R*, and consequently a decrease in output voltage. But instead, the VR tube is so "stubborn" in maintaining a certain voltage that it imparts some of its current to the load (by virtue of a change in resistance) and no additional current is drawn through *R*, thus maintaining the potential across the tube constant.

Wide Range of Applications

The service indicator lamp, a familiar item with most projectionists, is of course nothing more than another application of the glow discharge. Commercial glow lamps may or may not have a series protective resistor built within the base, and this item should always be checked when constructing a service lamp. Most lamps are clearly marked as to additional resistance, but when in doubt, it is of course safest to first test the lamp with an external series resistor.

In conclusion, it should be mentioned that use of glow discharges for purposes of voltage regulation represents only a

Magic Carpet to the 'Outside' World

No projectionist who purveys daily the magic imagery of a 3/4-inch of celluloid will fail to experience a thrill of personal pride in the appended excerpt from "San Quentin is My Home," by Warden Clinton T. Duffy, reprinted here with the gracious permission of "The Saturday Evening Post," which originally published material in its issue for April 20, 1950.

IT WAS not a matter of pampering the men or establishing just another prison precedent; it was just one more way of keeping them in touch with their lost world outside the walls, a world that needed to be kept attractive, so they would work to regain their place in it. There were some practical aspects, too, such as improving our educational system through the use of training films.

But it was virtually a hopeless idea, because the state could not finance it, and projectors, films and equipment were too expensive even for the inmates' fund. Later, during the spring of 1941, I was in Los Angeles on business and dropped in to see an old friend, Harry Warner . . .

"Tell me, Clint . . . how do the men at San Quentin like the new pictures we're turning out?"

"We don't have them in San Quentin," I said.

"What?" . . . "No movies at all?"

"Not even a newsreel. In fact, we have some men who haven't been in a theater since the old silent-film days."

I suppose it was inconceivable to Mr. Warner that there could be anywhere in the world an audience of 5000 men that had somehow eluded Warner Brothers. He was so disturbed . . . that he scurried around the studio and found two old projectors, which he promptly shipped to San Quentin with a dozen cans of film.

Warden's Misgivings Dissipated

I had misgivings about this undertaking, to be sure, because I had not forgotten Warden Holohan's biting response some years earlier, when I had broached the subject while I was his secretary.

"Now, Clinton," he said, "you know that's a damn-fool idea. Can't you imagine what would happen the minute you put several thousand men into an auditorium and turn out the lights? Why, every sorehead in the place would take care of his 'beefs' in the dark, and you wouldn't have room for all the bodies."

small phase of their application. They can also be used as oscillators, as indicators, as producers of light (either modulated or for display) and as protection for various types of circuits. They also have been used to a limited extent for rectification and amplification, although these applications have not proven entirely satisfactory and have given way to the more desirable thermionic type tube.

I knew he was exaggerating in order to make his point, but I conceded that perhaps there were some risks involved. Nevertheless, now that I was ready, I wouldn't back down, and I was confident the men would behave.

On a Sunday afternoon in July, 1941, San Quentin's mess hall was jammed with every man who could make the show. The lights went down, a few guards shifted uneasily, and machinery whirled in the makeshift projection room to start the first talking motion picture ever shown behind our walls.

I sat there in the darkness, listening for unusual sounds that might mean trouble among the men. But there was nothing. I was conscious of the scratchy loudspeaker and the sputtering of our imperfect projection lamps; but no one else heard this distracting noise. For these men were free again, if only for an hour: the steel and stone melted away in the shadows, and the magic of the screen gave a lift to their hearts.

I am sure that no audience anywhere ever cursed the villain with more gusto or laughed louder at a hoary joke, and when the picture faded out, the applause was frightening.

Thanks to our Hollywood friends who lent us the films, we have had movies in San Quentin ever since, and in all those years there has not been a single accident to give me any regrets. The men have kept up with the world, its fashions and fads, its politics and preaching, and that has probably been good for them all.

The weekly shows are a privilege, not a right, and only those with good conduct and work records are allowed to go. I think I can say that today most of our men would rather be punished with the old-fashioned strap than lose their pass for their movie hall on week-ends.

J. G. Wilson, RCA Exec, Dies

J. G. Wilson, Executive Vice President of Radio Corp. of America, in charge of the RCA Victor Division, died on June 1 at his home in Wynnewood, Pa. He was 50 years old.

Born in Alma, Illinois, Wilson had 30 years of experience in the fields of finance and merchandising. He joined RCA in June, 1944, as administrator of accounts and finance for RCA Victor. One year later he was named Operating Vice President and in 1947 was elected Vice President and General Manager. He became Executive Vice President in January, 1949.

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An Optical Alignment Check System

By CHARLES W. HANDLEY

Lighting Carbon Specialist, National Carbon Division, Union Carbide and Carbon Corp.

AN INVESTIGATION recently by the Screen Brightness Committee of the Society of Motion Picture Engineers revealed that many theaters are not getting the screen light their equipment is capable of delivering.* A further investigation indicated that in many cases, with the proper tools, large gains in screen light could be attained by periodic optical adjustment.

During the past year a number of manufacturers have placed suitable optical aligning tools on the market. This article will describe a number of these tools and explain how such tools may be used regularly to assure maximum screen light.

The theory of projection optics has been ably covered in past issues of IP; therefore, this discussion will be confined to describing a practical method of checking the alignment of the optical train, with little space given to theoretical considerations.

If one were firing a rifle, for example, one would certainly want the inside of the barrel to be free of obstructions. And if one were to periodically fire a bullet so that it would pass through three or

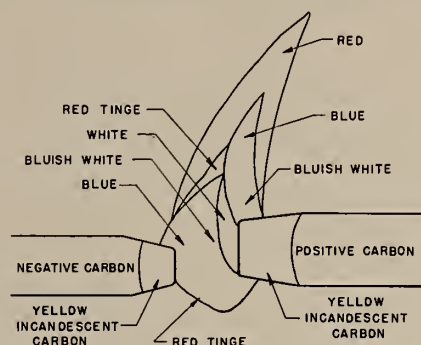


FIGURE 1

with the mirror. With misalignment, the plane in focus will include either shell light—which is of a lower order of intensity—and yellower, or arc stream light, which is also of lower intensity, and bluer.

The problem is more readily visualized if the gas ball be considered as a flat luminous disc on the end of a tube, with the open face directed toward the mirror.

FIGURE 2



more separate rifle barrels located in a straight line, one would often check his alignment to be sure it remained true. Furthermore, one would not think of moving one rifle barrel without making compensating adjustments to the others.

Precise Alignment Necessary

So it is with a projection optical system, in which light, "fired" from the high-intensity carbon crater, must pass through a number of directing devices on its way to the screen.

In a high-intensity carbon arc projection system, utilizing a mirror lamp, all of the brightest portion of the gas ball cannot be focused on the film plane unless the positive carbon is lined up *precisely*

This mirror, as has been pointed out in previous articles in IP, has two focal points, both on the central axis passing at right angles through the hole in the mirror. One focal point is about 5 inches from the base of the mirror; the other something more than 30 inches. The optical properties of the mirror are such

FIGURE 3



that whatever object is placed at one focal point will be imaged at the other.

In projection usage, it is the intent to locate the brightest part of the carbon arc crater (the luminous disc on the end of the tube) at the closest focal point, with the film aperture at the other. With misalignment, some portion of the less brightly illuminated region in the vicinity of the disc will be located at the one focal point. The result, as indicated by Fig. 1, will be not only a very great loss in light intensity but also a marked variation in the color of the light directed to the other focal point.

Another critical alignment factor requires that the film aperture be actually located at the second focal point, as just assumed. Finally, the axis of the projection lens must be properly aligned beyond, so that, like one of the rifle barrels in our earlier analogy, it may permit unobstructed passage of the light to the screen.

It is thus evident that unless crater, mirror, aperture and projection lens are *all* in rifle-barrel alignment along a common axis, it will be impossible to bring them into line with the conventional controls. Why? Because these controls can only change working distances along the axis or necessitate tilting of the mirror in various ways.

Mirror Suspicion Often Unfounded

This fact often creates the belief that a given mirror is too inaccurate for suitable operation; but before such a mirror is discarded it should be tested under conditions of correct optical train alignment. Sometimes a quick check may be made, if the other lamp seems to give satisfactory coverage, by merely switching mirrors and testing the suspected mirror under conditions of alignment known to be satisfactory.

Basic alignment of the aforementioned elements is a prerequisite to all successful optical adjustments.

Not only must the mechanism be so aligned as to hold the carbon crater with the gas ball in its proper position with respect to the mirror, but operation must be maintained so that the crater remains in that position during the burning of

* "Addendum to SMPE Screen Brightness Report"; IP for May, 1949, p. 21.

the trim. If, for example, a short grip on the positive carbon (Fig. 2) causes the crater to raise out of its proper position, then discoloration and loss of light will result, just as though the entire mechanism were out of line. This is also true of a warped or improperly designed carbon-saver, which will either raise the positive carbon in the holder or allow it to tilt in one direction or another.

Figure 3 illustrates an arc lamp aligning kit manufactured by Brenkert Light Projection Co. Although this article concerns itself chiefly with F:2.3 mirror-type lamps, the manufacturer's instruction sheet, which includes information on condenser types as well, is reproduced here:

Brenkert X-10,001 Aligning Rods

"This kit consists of four rods complete with flanges, and one projector lens-mount adaptor. The flanges and adaptor are made of aluminum, and the rods are made of stainless steel to eliminate any possibility of rusting, even under conditions of extreme dampness.

"CAUTION: It is important that these rods be handled with the same amount of care that would normally be given to any precision tool. Accurate alignment of an arc lamp and projector mechanism depends on each rod being absolutely square with the face of its flange. The wooden case . . . furnished with these tools is designed to give maximum protection to them.

"Two rods are furnished for lamps using Suprex† 7-mm and 8-mm positive

† Trade Mark of National Carbon Division, Union Carbide and Carbon Corp.



FIGURE 5

carbons, and one for the super high-intensity arc lamp using the 13.6-mm positive carbon. The diameter of the rods in millimeters is stamped on each flange. To check the alignment of the arc lamp with the projector mechanism, proceed as follows:

1. Remove the projection lens and clamp the lens adaptor in the lens mount.
2. Remove the carbons from the arclamp and move the positive carbon jaw assembly toward the reflector.
3. Open the arclamp light dowser and lift up the automatic fire shutter; slide the long rod through the lamphouse, through the film trap of the projector mechanism, and through the hole in the lens adaptor. (CAUTION: Be careful that the rod does not slide through the lens adaptor and hit the glass in the projection port.)
4. Move the positive carbon jaw assembly to a position midway between its full-trim position and the carbon guide, and clamp an aligning rod in the carbon jaw with its free end resting on the carbon guide, and its flange adjacent to

the flange on the rod through the lens mount. Use the aligning rod marked 8-mm if an 8- or a 9-mm positive carbon is used in the arclamp, and the 7-mm rod if a 7-mm positive carbon is used. Use the rod marked 13.6 mm with a super high-intensity lamp by inserting the free end of the aligning rod into the jaws and feed mechanism from the front of the positive head assembly.

5. Adjust the lamphouse on its base vertically and laterally until the adjacent flanges are absolutely flat against each other and flush radially. When this condition has been attained clamp the lamphouse to the projector base and remove the rods."

Peerless Optical Alignment Unit

Figures 4 and 5 illustrate the tools supplied by J. E. McAuley Mfg. Co. Instructions for the illustrations follow:

"This No. 2653 disc and No. 2654 rod, together with one No. 15,885 disc and the No. 15,886 rod of our No. 15,885-A Peerless Hy-Candescent optical alignment appliance, provides means for accurately aligning the optical axis of the Peerless Magnarc lamps with the optical axis of the projection lens; also, to precisely set the correct working distance, between the positive carbon crater and the projector mechanism aperture, which in turn will automatically result in the placement of the reflector vertex at its correct focal position.

"Figures 4-A and 4-B illustrate the proper use of rod No. 2654 in lamps equipped to use either the 6 x 7-mm or 7 x 8-mm carbon trims.

"To set the lamphouse in its correct position from the projector mechanism aperture: first loosen the screws which hold the lamphouse to the lamphouse table casting on the pedestal, so it may be moved forward or backward as needed. Place all parts of the alignment appliances in position shown in Fig. 4-C, and adjust the lamphouse toward or away from the aperture to bring about the condition illustrated in Fig. 4-C; then retighten the lamphouse position screws.

"To align the lamp axis with the projection lens axis: by means of the adjustment at the top of the projector pedestal, for the lamphouse table casting, centralize the rims and parallel faces of the two discs, after which securely retighten all adjustments to assure a permanent setting of the lamphouse support table.

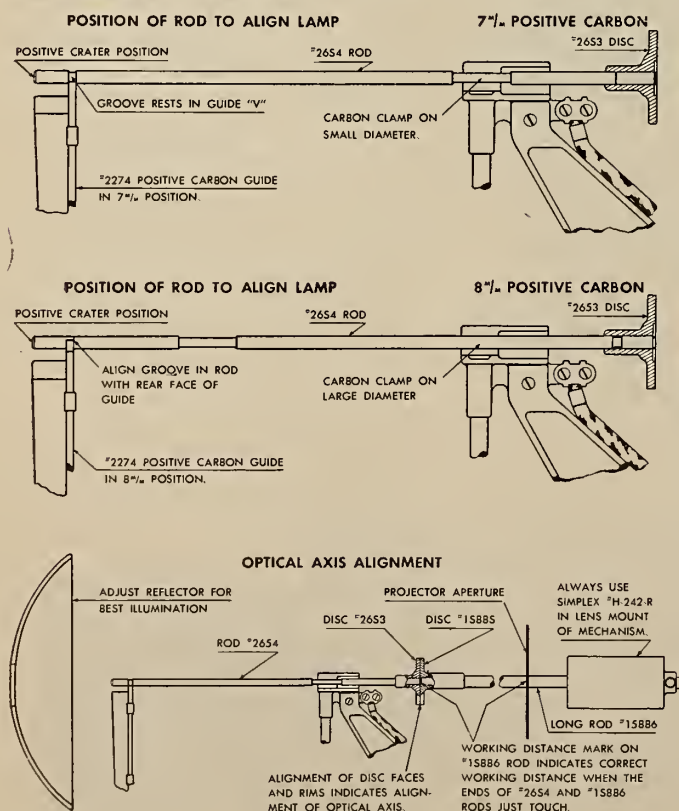


FIGURE 4

Showing the tools supplied and methods employed for aligning Peerless Magnarc arclamps. 4-A, at top, refers to the 7-mm positive carbon; 4-B, center, to the 8-mm positive carbon, and 4-C, bottom, to the optical axis alignment.

"After completing the foregoing adjustments, strike the arc and, by means of the manual reflector adjustments, adjust the reflector as may be required to obtain the best illumination and light distribution.

'Hy-Candescent' Alignment Unit

"This new appliance provides means for accurately aligning the optical axis of the lamp with the optical axis of the projection lens, and also to precisely set both the working distance between the condenser system and the projector aperture or film plane, and the focal-distance between the face of the positive carbon crater and the plano surface of the rear F:2.0 condenser lens.

"Operation No. 1, Fig. 6. Before inserting the alignment rods and discs, be absolutely certain that the burner is adjusted to its central position inside the lamphouse. See paragraphs 5 and 6 under the title 'Installing Burner' in our Hy-Candescent Lamp Instruction Book.

"Next, install the alignment appliance as in Operation No. 1, Fig. 6, and by means of the adjustments for the lamphouse table casting, at top of the pedestal, centralize the rims and parallel the faces of the two discs as nearly as is possible.

"After this has been done to make the finer, finishing alignment the burner position should be adjusted inside the lamphouse. All adjustments should be retightened securely.

"Operation No. 2, Fig. 6. Insert the condenser mount, with lenses, in its support cradle, and open the inside dowsers. Insert a new positive carbon in the burner, with its arcing end protruding

the correct burning distance, and clamp it in position. Next, adjust the condenser mount so that the trimming wrench handle will just fit between the front face of the positive carbon and the rear condenser. Following this, the final operation is to slide the entire lamphouse, back or forward, in its tracks and securely clamp it at the point where the indicating ring on the front rod aligns with the faces of the film tracks in the projector mechanism."

Strong Aligning Kit No. 23,483

Harry Strong, of The Strong Electric Corp., states: "If you want an aligning tool that will align crater, aperture and lens as straight as a piece of string, the best thing to use is a piece of string." His resultant alignment method is illustrated by Fig. 7. Instructions for the use of the Strong kit follow:

"The Strong lamphouse aligning kit is designed to fill the need for an accurate and reliable method of locating reflector-type projection arc lamps on the projector base, so that the ultimate in optical efficiency and screen illumination is obtained.

"As a result of the careful use of this tool, the lamphouse will be aligned so that its optical axis is in line with both the center of the aperture and the center of the lens.

"Prop open the fire shutter, open the changeover dowsers and turn projector mechanism by hand so that shutter blades are clear of the projector aperture.

"The projector lens should now be removed and the tube with the cord attached, passed through the lens holder

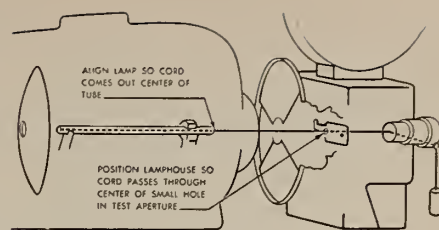


FIGURE 7

and into the lamphouse. The tube should be clamped in the positive carbon jaw in exactly the same position as the positive carbon as shown in accompanying cut.

"Place the dummy lens in the projector and locate test aperture as shown. The test aperture is held in place by closing the projector film gate.

"The lamp shall now be moved side-wise, or up and down, and also tilted on either plane until the cord comes through the center of the open end of the tube which is clamped in the carbon jaw and passes exactly through the center of the test aperture hole."

The foregoing illustrations and text show how the optical alignment of the projector and lamphouse may be checked and they describe means of accomplishing the desired result. On some of the older type bases ingenuity may be required to determine means of shimming and adjusting, but *proper alignment is necessary for maximum brilliancy, a good field and correct color of screen light.*

After alignment has been accomplished, the other factors involved in optical train adjustment may be determined by a methodical procedure which will be described later.

Mirror-to-Film Plane Setting

The numbers of the back of the mirror should be checked against manufacturer's data to determine the proper working distance. It is not safe to assume the working distance from mirror diameter alone. As a matter of fact, one lamp manufacturer provides mirrors of three different working distances for the same lamp.

The working distance is measured from the inside edge of the mirror centerhole to the film plane. When this distance has been determined from data, the lamphouse should be moved on the base to the prescribed distance, plus or minus 1/2 inch. Next, the arc-to-mirror distance should be explored, as will be described, until the best visual results are noted on the screen with shutter running, but without film in the projector. Secure the lamp to the base at the point of best visual results over this range.

During these checks it will be necessary, of course, to make use of the lateral and vertical mirror adjustments to arrive

(Continued on page 33)

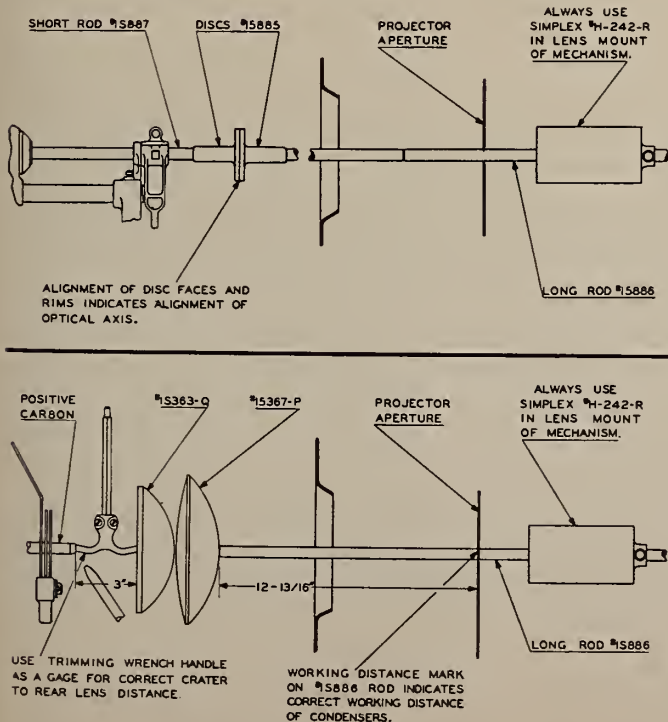


FIGURE 6

Showing method for aligning the optical axis on Peerless Hy-Candescent arclamps. At top is Operation 1; at bottom is Operation 2.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

IN OUR opinion, the recent settlement made by the National Labor Relations Board in the long-standing dispute between Local 24 of the Musicians Union and the management of the Palace Theater, Akron, Ohio, merits further study by all Local Unions. Immediately upon the enactment of the Taft-Hartley Act, which prohibits *forced* hiring of standby labor, the Palace Theater dismissed its nine-man standby band. The musicians Local could do nothing about the matter until late 1947, when the theater engaged the Ray Eberle orchestra. The theater management turned down Local 24's suggestion to hire a standby band for the opening and closing of the Eberle orchestra performance.

As a result, national headquarters of the Musicians Union cancelled Eberle's booking at the theater. In 1949, when another orchestra was engaged to play at the Palace, the same routine was repeated, and the theater then filed charges against the union with the NLRB.

Wm. E. Spencer, trial examiner for the NLRB, recommended dismissal of the charges against the union, pointing out that there was nothing in the T-H featherbedding clause forbidding an employer and a union from contracting for standby services so long as the union does not "cause or attempt to cause an employer to engage or agree to engage in such practices." Examiner Spencer stated further that since Local 24 had not threatened a strike at any time, there was no "cause or attempt to cause" any violation of the T-H act. Very interesting, indeed!

- The regular May meeting of the 25-30 Club witnessed the obligation into membership of Admiral Rutherford B. Tompkins and Arthur E. Meyer, president and general sales manager, respectively, of International Projector Corp. Morris J. Rotker, acting vice-president of the Club, presided at the ceremonies.

- Veterans of World Wars I and II are invited to join the Peter G. Lehman Post, named in memory of the late son of U. S. Senator Lehman of New York, champion of organized labor. This post was organized several years ago by Charles Sher-

man, member of N. Y. City Local 306, who may be contacted for further information at 3422 Knox Place, Bronx 67, N. Y.

- F. T. Bowditch, engineering vice-president of the Society of Motion Picture & Television Engineers has asked us to enlist the support of projectionists in the national survey of screen brightness levels which will be launched shortly by the Screen Brightness Committee of the Society. Since this endeavor is directed at the establishment of proper light levels for theater screens (all to the good as far as projectionists are concerned), we are glad to endorse wholeheartedly the project.

We ask projectionists for full cooperation and, above all, *accuracy* in compiling the requested data—this helps us; of the SMPTE Committee we ask that they try to give at least 24 hours advance notice of any tests they wish to make in a given theater. Our fellows are willing to go down the line in support of any endeavor which helps the business as a whole; but we should like it if our participation in the business of living as a human being were not infringed, say, a half hour before closing time.

- George W. Cole, charter member of Boston Local 182, celebrated his 94th

birthday last month. An inveterate cigar smoker, George has the pep and energy of a man half his age.

- Tom Shea, assistant IA president, and Felix Snow, 6th IA vice-president, attended the Iowa State Association meeting held recently in Sioux City.

- We believe that John Milne, equipment manufacturer's representative from London, England, left our shores several weeks ago with a pretty high regard for American business methods. Allen G. Smith, manager of the N. Y. City branch of National Theater Supply Co., spent considerable time with Milne helping him iron out a couple of knotty problems. Whether or not NTS will profit directly from these conferences is beside the point; what we are trying to get across is the fact that despite a very busy schedule, Smith went to great lengths to get Milne off on the right track.

- A gold life membership card in St. Louis Local 143 was awarded last month to Bill Earle, Sr., manager of the National Theater Supply Company local branch. Tony Blust, president, made the presentation on behalf of Local 143. This makes the second such award made to a St. Louis supply manager, the first

GENERAL OFFICE TOPPERS INSPECT IA EXHIBIT AT AF OF L INDUSTRIES SHOW



IA General Secretary-Treasurer Raoul and President Walsh inspect the IA exhibit which won top honors at the recent AF of L Union Industries Show held in Philadelphia May 6-13. Planning, construction, equipping and every detail down to the content and staging of the program was exclusively an IA job. Various phases of IA craftsmanship were depicted in special film.

having gone to Lou Walters, former NTS branch manager.

- The complete recovery from a serious illness of A. B. Zumer, secretary of Local 257, Ottawa, Canada, was greatly retarded by Zumer's allergy to treatment with the sulfa and penicillin drugs, both of which were prescribed by his physician. He came through after a tough struggle, however, and we are glad to report that A. B. is once again attending to his official duties.

- Braving fire and nitrous fumes when motion picture film ignited in his projection room, William A. Lynn, projectionist at the Royal Theater, Cincinnati, Ohio, risked his life when he stopped to close the projection room ports and slam the door before fleeing for safety. Some 300 persons in the theater were thus protected from inhaling the deadly fumes. Fire Marshal Vogel, of Cincinnati called Lynn's escape from serious personal injury nothing short of "miraculous."

- One of the highlights at the golden anniversary dinner given last month by New Haven Local 74 was the presentation of gold life membership cards to charter members Edward O'Connell and Joe Farrell, in commemoration of 50 years membership in the Local. A number of top IA officials were among the honored guests.

- Failing health forced Leo Barber, business representative for Local 245, Lynn, Mass., to resign from the presidency of the Lynn Central Labor Union. We hope that Leo will have regained his health in time to attend the IA Convention in August.

- Bill Maxon, member of Syracuse Local

376, was elected vice-president of the Syracuse Federation of Labor District of the Union Label and Trades Department of the State of New York. He was also elected a delegate to the State Federation of Labor Convention which will be held in N. Y. City July 30 next.

- Several months ago when we listed the names of officials who have served their Local Unions for 25 years or more, we inadvertently omitted the name of E. L. "Red" Gullatt, who was recently re-elected to his 26th consecutive term as secretary-treasurer of Local 568, Columbus, Ga. "Red" will represent his Local at the Detroit Convention next August, at which time we shall offer our apologies to him in person for our unintentional slight.

- We were sorry to learn that Barney Perlman, associated for many years with the GoldE Mfg. Co. of Chicago, met with a serious automobile accident while on his way home from a Florida vacation. Barney is hospitalized at Gainesville, Fla., and his many friends in the industry are rooting for a speedy and complete recovery.

- The Tri-State Association (Pennsylvania, Ohio, and W. Virginia) will hold its 26th annual meeting in Erie, Penna., July 25, at which time officers will be elected. Members of the IA official family have been invited to attend the clam-bake, following the close of the business session.

- Salvatore J. Scoppa, 60, charter member and business representative for many years of Studio Mechanics Local 52, N. Y. City, succumbed to a fatal heart attack early this month. Sal was organizer of Local 161, N. Y. City (Motion

IA REP. JOE BASSON BACK IN HARNESS



Shown at the recent testimonial dinner which marked the return to duty of IA Representative Joe Basson, following an extended illness, are (l. to r.): Tom Shea, asst. IA president; Basson, Mathew Levy, of IA legal counsel, Fred Raoul, IA general sec.-treas.

Picture Assistant Directors), and up to the time of his death was its business representative. Early this year he organized the city's film and makeup artists and hair stylists, chartered April 1 last as Local 798.

Several years ago he played a prominent part in the late Mayor La Guardia's abortive plan to move film production East. For more than a year Sal had been handling special assignments for the IA General Office. He is survived by his widow and three sons, all of the latter being members of the Alliance.

- The many friends of Tom LaVezzi, of LaVezzi Machine Works, will be glad to know that he is back on the job again after a long period of convalescence from a serious illness.

- The recent unanimous election of Jimmy Brennan, 4th IA vice-president, to the presidency of N. Y. City Local 1, is an indication of Jimmy's tremendous popularity with the membership. He last served Local 1 in an official capacity back in 1936, since then devoting all his time to IA duties.

- The sign of the double-cross and the apathetic attitude of so-called "Union sympathizers," extending even to an official of a sister AF of L unit, marked the failure of passage of the two-man projection crew bill at the recently adjourned session of the Rhode Island legislature. Passing the House with flying colors, the bill failed to be reported out by the Senate Labor Committee, which put by the quietus on any hope of passage this year.

Typical of the all-out campaign waged against such legislation by anti-labor forces was the publication in the *Providence Journal*, on the eve of House action, of a scurrilous letter against the bill, the author of which was subsequently proved to be a complete phony

BON VOYAGE SENDOFF FOR IA PRESIDENT AS UNESCO DELEGATE TO MEETING IN ITALY



Local 306 executives and members pipe Dick Walsh aboard *Queen Mary* en route to Italy as a delegate to the United Nations Educational & Scientific Cultural Organization. Shown here (l. to r.): Frank Inciardi, Educational Committee; Izzy Schwartz, fin. sec.; Harry Garfman, Brooklyn bus. rep.; Abe Kessler, treas.; Ben Stern, sec. 25-30 Club; Herman Gelber, 306 pres.; Irving Holtzer; Ernie Lang, sec.; Dick Cancellare, exec. board; IA President Walsh, Louis Rameo, sgt.-at-arms; Dave Garden, exec. board; Harry Starin, vice pres.; Eddie Stewart, exec. board, and Steve D'Inzillo, N. Y. bus. rep.

hiding behind a pseudonym. Even so, favorable House action ensued.

Chairman of the Senate Labor Committee which failed to report the bill out is Senator Scambato, a paid organizer for the Textile Workers Union.

IA units in Rhode Island strived mightily to put the bill over, spearheaded by Providence Local 223. Secretary Syd Clarke, of the latter organization, was the driving force behind the IA effort, giving unstintingly of his time, knowledge and effort to effect passage of the bill. Syd's rebuttal to the anonymous letter mentioned previously was a masterpiece of rational thinking and went far to insure favorable House action.

Disillusionment, double-cross and despair seem to be the inevitable result of such efforts when launched on the treacherous currents of politics.

- Projectionists in the Pittsburgh area are invited to join the newly-organized "Monday Midnighters," a social club organized by members of Local 171, headed by Bill Thompson, the Local's business manager.

- June 21 is a red-letter day for Morris J. Rotker, past president of the 25-30 Club and member of Local 306, because it marks his 36th wedding anniversary. Morris has been favored with four children and seven grandchildren. The impressive record of civic activities compiled by this eager beaver was detailed in IP for January last, p. 22. Congratulations and the best of luck, Morris.

25 Years Ago—June 1925

- The General Executive Board meeting was held June 29. . . . Bill Dillon, 3rd District Secretary, issued a call to all Local Unions in the District to send him copies of their contracts. . . . Hamilton Local 303 was successful in defending damage suit instituted by Hamilton exhibitors. . . . The 11th annual meeting of the 11th District was held in Ottawa, Canada, June 19-20. . . . "Abie's Irish Rose" chalked up its 1284th performance. . . . The AF of L established a Legal Information Bureau, the purpose of which was the compilation of statistics with reference to injunction proceedings and related matters.

Six New W. E. Recording Licensees

Six new motion picture and disk recording licensee agreements covering the use of Western Electric equipment have been completed with studios by the Westrex Corporation, according to E. S. Gregg, vice president. J. De Bretagne and J. Hawadier, Paris, France; Elwood Jon Nicholson (Cinematic), Hollywood, and Toby Anguish, Los Angeles, signed film recording contracts. Richard C. Simonton and Radio Recorders, both of Los Angeles, and Telescriptions, Inc., New York, are the new disk licensees.

IA-IP Amateur Radio List

WHEN that eager beaver and amateur radio enthusiast Amos Kanaga sets out to do a job he really delivers. Directing his forces on a sectional basis, Amos collected the data on nearly 100 IA men who operate amateur stations. The accompanying listing of these radio hams does not do justice to the remarkable job done by Amos within the short space of three weeks, because many IA men who responded failed to include

CALL NAME—LOCAL NO.

W2TSN	Victor Bufis—L. 365
W2WZX	Erich Pattky—L. 244
W3MEY	Leo Foran—L. 335
W4FGK	D. H. Knight—L. 412
W4HJC	Arlie Belflower—L. 225
W4MCT	Jim Davis—L. 552
W4NOM	Buddy Rogers—L. 225
W2CYQ	Frank Larham—L. 108
W2ARP	Fred Ramhorst—L. 534
W4PKT	M. H. Sanders—L. 507
W4CIU	Bill Britton—L. 537
W5IIP	Pat Talbot—L. 249
W5DYV	Bob Belian—L. 604
W6BAA	Amos Kanaga—L. 409
W6UZA	Malcomb Keele—L. 150
W6DPU	Ray Brann—L. 150
W6PFF	Frank Champlin—L. 150
W6PQS	Joe Wilson—L. 504
W6ALO	Tom Gentges—L. 504
W6GTP	E. Schwartz—L. 695
W6MTO	Leroy Wardel—L. 762
W7LAT	Fred Jones—L. 720
W7PEC	Jim Harford—L. 720
W7AXY	John Murphy—L. 91
W7ALM	Chester Lamont—L. 446
W7FJZ	Z. A. Sax—L. 159
W8VDP	Jack Harwood—L. 160
W8BYT	L. Grazier—L. 160
W9NLP	Rolly Long—L. 110
W9OL	W. P. Atchison—L. 323
W9NPG	John Bain—L. 323
W0VGC	H. F. Heckel—L. 230
W0ZIM	M. Geiskieng—L. 230
W0GSW	Jim Evans—L. 242
W0JSU	John Cresap—L. 242
CANADA:	
VE7OT	M. Thoreau—L. 348
VE3ABV	Jack Snider—L. 173
VE3BAK	F. Winkle—L. 173
VE3BVC	E. H. Whyat—L. 173
VE3BWW	Lou Lodge—L. 173
VE3DBF	M. Winslow—L. 461
VE3OG	H. Horner—L. 173
VE3TE	Tom Burrows—L. 173

their Local Union number and therefore could not be included in the current listing.

Those IA men who have contacted Amos but whose names do not appear in the current listing should drop him a card immediately and be sure to include their Local Union number. Also, those who contact Amos in the future should also give their affiliation. Amos, who is Secretary of Local 409, may be addressed at 623 Capuchino Drive, Millbrae, Calif.

Prizes for Extensive Coverage

In view of what he terms the "grand cooperation" of IA men everywhere in making this listing possible, Amos has come up with another idea which has the enthusiastic support of IP. The plan is that a contest be held among the IA-IP radio gang to determine who can contact the most IA men over the air within a given period of time. Prizes in the form of certificates would be given to the top scorers in each of the ten districts, plus another for Canada. Topping this off would be the award of a grand prize—the IA-IP "Oscar"—for the man who is considered to have performed the outstanding public service of the year.

Amos holds that such a contest will serve to not only make for nation-wide camaraderie among IA craftsman but will also be a lot of fun in the doing. IP concurs. So send along your QSL cards to Amos, being sure to include your Local Union number, and also advise him of any other IA men you know who are amateur radio operators.

Frank Larham, 112 Seneca St., Penn Yan, N. Y. (W2CYQ) is acting as Eastern collector of the IA-IP radio list.

B. & O. Railroad 16-mm Campaign

Twelve regional safety divisions of the Baltimore & Ohio Railroad Co. have been supplied with complete RCA 16-mm sound projection equipments, and other audio visual aids, as part of a program to provide the entire railway system with the most modern safety instruction facilities.

Films showing results of walking railroad tracks, throwing stones at passing trains, and other hazardous practices will be shown in schools and to public groups in all communities along the B.&O.'s right-of-way.

Equipments have been delivered to the following B.&O. safety divisions: New York, Philadelphia, Baltimore, Pittsburgh, DuBois (Penna.); Akron, Dayton, Cincinnati, Grafton (W. Va.); Chicago, and general headquarters at Baltimore.

French Projectionist Qualifying Test

The examination for the Certificate of Professional Aptitude for French projectionists includes a half-hour practical test, three one-hour papers, and an oral examination. The certificate is not as yet indispensable for obtaining a license.

New Simplex Sound System Shown by IPC

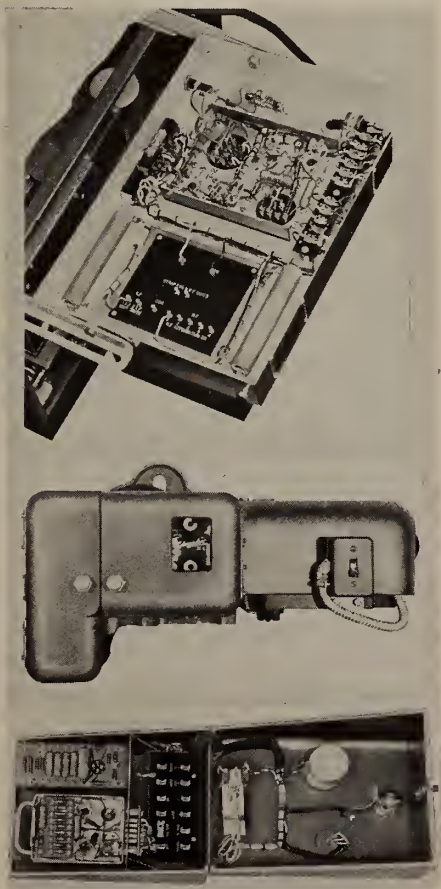
COMPANION unit to the Simplex X-L projector recently announced is the new X-L sound system just introduced by International Projector Corp. The new equipment, of completely new design, is intended to provide higher standards of tonal quality for all theaters, large or small. The same basic components are used in a system for every size of house, enabling small theaters to give the same fine sound as the largest theater.

Utmost reliability of operation and complete adaptability to present and future requirements are combined with extreme flexibility to meet all acoustical conditions. This flexibility permits power to be increased, when desired, merely by adding to or changing the power amplifier.

Compactness, Accessibility, Reliability

The streamlined X-L soundhead is enclosed in smoothly curved covers yet with all parts instantly accessible for servicing. The pre-amp, of radically new design, is extremely small and compact, but its components are all full-sized. It has its own chassis with a new quick-action plug-in feature which permits split-second replacement in an emergency, using the "spare" pre-amplifier which is in the non-synchronous cabinet. The pre-ampli-

SIMPLEX X-L NETWORK, OPEN POSITION



X-L NON-SYNC CABINET, CLOSED

fier has its own compartment in the soundhead, positively shielded from oil.

In the new exciter lamp turret dual lamps are mounted on a single fixture so that either lamp is ready for instant use. In the event of lamp failure, a readily accessible lever swings the stand-by lamp into position. The turret is so designed that the replacement lamp clicks into perfect alignment without adjustment. This emergency protection is further enhanced by the availability of a-c power which may be switched on instantly if the d-c source should fail.

A new wall-mounted universal cabinet contains all power amplifiers, the network, monitor power source and the power supply for the exciter lamp. The same compact cabinet is used regardless of amplifier power requirements. Thus, step-up in power is accomplished merely by replacement of the units, no other change being necessary. Each unit in the universal cabinet—power amplifiers as well as monitor, network and exciter lamp power source—has its own chassis. The complete chassis is installed with only two screws. Wiring connections are made with spade lugs and the terminal boards are placed at the right front of the cabinet for maximum convenience.

For greater accessibility, each chassis is mounted on slides so that the entire unit can be pulled out as easily as a desk drawer, exposing all parts. When inspection or servicing requires that the bottom of a unit be exposed, the slide is pulled out and the entire unit flipped over, making each unit as fully accessible from the bottom as from the top and sides. This may be done without halting operation.

Meets All Power Requirements

Complete adaptability to the power requirements of any theater from the smallest to the largest is achieved with the one basic X-L system simply by having different power amplifier units. No more than two power amplifier units are ever required for normal theater operation, both being in the universal cabinet. In emergency, where two amplifiers are used, the

X-L SOUNDHEAD IN CLOSED POSITION

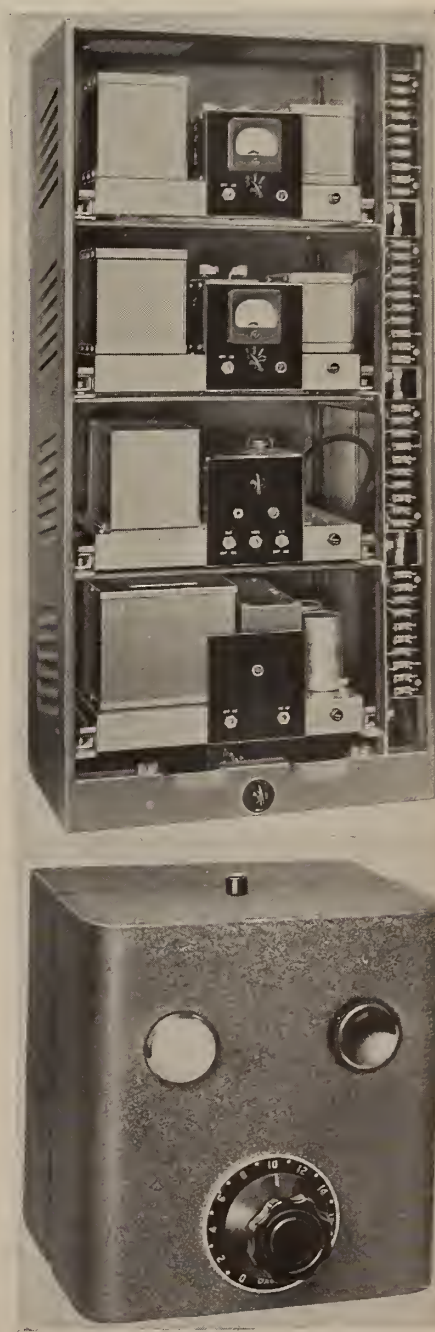
system can be operated with completely satisfactory results on just one unit.

This flexibility by which the system may be operated on one or both power units offers maximum protection against trouble. Each power amplifier unit has its own tube testing meter built right in as a further convenience. Frequency response is extremely flat over an exceptionally wide range, to deliver the highest quality of sound in varying auditoriums regardless of the difference in acoustics.

As noted, the universal cabinet also contains the network and the monitor amplifier. The latter has its own power supply so that the system may be monitored without loss of system power. Again, as protection against emergency, the monitor may be used even in the event of failure in its own power source. The network unit is provided with switches for testing high- and low-frequency speakers and, as an additional safety factor, either range can be run alone if necessary.

The exciter lamp power supply also is included in the universal cabinet for easier installation, greater ease in maintenance and to save space. Constant

SIMPLEX X-L AMPLIFIER CABINET, OPEN



X-L CHANGEOVER CABINET, CLOSED

sound level is achieved by a voltage regulating transformer and a selenium rectifier built into this unit. The monitor loudspeaker also is newly designed. It has a top quality, full eight-inch speaker set in an acoustically engineered cabinet which gives an excellent "picture" of the tonal output.

The non-synchronous cabinet is completely self-contained and provides a selector switch for microphone or turntable inputs. Pre-amplifier unit in this cabinet is the "spare" for use in the soundhead, if conditions require it. Replacement is made instantly. A convenient handle at one end of the pre-amp permits it to be withdrawn in a single motion and two sturdy guide pins at the other end steer it unflinchingly into place without fumbling. Also in this cabinet is the changeover switch with fader control.

The changeover cabinet for each projector is another innovation in design. Compact, extremely convenient, it is easily mounted under the projector port on even the most crowded front wall. Changeover is absolutely inaudible. There is no mechanical linkage between projectors.

Wiring is as simple as possible, with only one extra wire necessary even on a 3-projector installation. With this new changeover, one soundhead goes on and the other automatically goes off when the single finger-contour push-button is pressed.

Speakers Reflect Latest Advances

The Simplex "Voice of the Theater" speakers are new in design and performance. The high-frequency units have a new acoustic filter cap which maintains smoothest frequency response in the crossover region. The single dividing network handles all power requirements and speaker combinations so that any expansion in power, or any speaker units, will not require replacement of the network. The network also safeguards against damage to the diaphragm through overloading.

The low-frequency speakers contain horns of new design which permit greater flexibility and better tonal quality. The frequency range of the Simplex X-L system encompasses the full scope of music, voice and other audible sounds—with a wide margin of capacity at each end. Thus, if improvements are made in recording techniques, the X-L has the extended range to handle it.

The X-L sound system is on display at National Theater Supply Co. branches.

The history of 110 years of photography is displayed at George Eastman House, the world photographic center in Rochester, N.Y. A photographic print from the first paper negative is one of the historical articles on display. Cameras concealed in binoculars, canes, revolvers, and even in a necktie are included in a display of "detective" cameras.

Paramount Head Assays Tv Impact on Movie Theaters

"I AM firmly convinced that the properly located and well-run American motion picture theater is solidly established as an American institution and will continue for the foreseeable future, to be our principal customer," Barney Balaban, president of Paramount, declared at the recent annual stockholders' meeting, during a discussion of television and the film industry.

The Paramount head said that comparative studies fail to show any *direct* relationship between the rise of Tv and the decline in box offices. He said that receipts in areas studied were substantially the same where there was a high concentration of Tv sets, or where Tv was not an influence.

Effect of 20-30 Million Tv Sets

Balaban, however, did not discount the inevitable impact of a possible 20 or 30 million video sets upon the entertainment habits of the public. Tv, he said, is bound to exert a far-reaching influence upon our business, but its effect will have its "pluses" and its "minuses."

"At this time," Balaban said, "it is too early to add up the final score. I am sure that when that time comes, the prophets of doom will have been proved to be false prophets. Tv has much to give to motion pictures, and motion pictures have much more to give to Tv. When each has become constructively oriented to the other, perhaps the stimulus that each can give to the other will usher in a new era of prosperity for both."

In order to meet the effect of home Tv, Balaban said, it will be necessary to produce better and better pictures at lower costs, and the exhibitor and distributor "will have to sell them to the public with all the showmanship 'know-how' of which our industry is capable."

Par's Extensive Tv Activities

Balaban recalled that Paramount has pioneered in Tv for many years, and has owned an interest in DuMont Laboratories since 1938, and that the integrated company opened Tv stations in Chicago in 1940 and in Los Angeles in 1941. In this connection, he reported that KTLA, Los Angeles, owned by a Paramount subsidiary, is now in the "black," and he believes the Chicago station, owned by a subsidiary of United Paramount, also is operating at a profit.

Balaban referred to Paramount progress in large-screen theater Tv and its recent purchase of a 50% interest in Chromatic Television Laboratories, through which "we shall be financing and participating in the promotion of color Tv."

Asked from the floor if Paramount had considered selling rights to its films for home television, Balaban said Tv rights

at the present time could contribute but a negligible portion of film costs.

CBS All-Electronic Tv Set Shown for First Time

Columbia Broadcasting System showed an all-electronic Tv color receiver for the first time at the recent FCC hearings on color standards. Considerably smaller than the mechanical-disc receivers, it produced a brilliant picture on a standard RCA projection screen, according to a report by *Tele-Tech*, ranking journal of the telecommunications industry.

The colors were, as usual in the CBS system, reproduced with great fidelity and when the subject for the demonstration entered the room after the showing there was no doubt that the colors seen on the screen were those she wore.

Although the effect of interlace on the CBS system was the point to be emphasized, in the minds of many observers the big screen bright projection picture was of greater import. It refuted the claims of many engineers that CBS suffered from the drawback of excessive flicker and color breakup if the screen brilliance is increased. In the demonstration it was impossible to produce any signs of color breakup by the usual expedients of waving fingers or bright objects in front of the beholders' eyes.

Three-Color Tube Used

The projection set uses a 5-inch tube made by the Rauland Co. Three phosphors—red, green and blue—are deposited on the face and three pictures, one in each color, placed side by side across the tube. A triple lens focuses and combines the three pictures on the projection screen from the rear, following usual projection practice.

At present only the green phosphor used in the all-electronic projection receiver has a long persistence characteristic and produces a picture on the projection tube having an intensity of approximately 560 foot-lamberts. When viewed directly, the absence of flicker at this intensity may be observed, and in contrast the flicker on the short persistence red and blue phosphors is quite apparent.

Another Tv vs. Theater Survey

While only 24% of Tv set owners in the Hollywood, Calif., area would pay average theater scales to see telecasts in a theater, 59% would be willing to pay \$1 to see a first-run movie on their home receivers, according to a Woodbury College survey of Tv progress in Southern California. Survey was based on a random area sampling of some 3000 Tv set

owners in the Los Angeles area, and in the fringe areas of Riverside, San Diego and San Bernardino.

Area is part of the territory where 20th Century-Fox plans early in 1951 to test big-screen theater Tv.

Half of those who had their sets for over a year were viewing Tv as much as when the receivers first came into the home; 19% were viewing more programs, and 28% were viewing less frequently. At the same time, 39% of the full-year owners were going to the movies as frequently as before; 34% attended less frequently; 2% more frequently than before getting Tv, and 8% had *stopped* theater attendance.

'Bounce' Tv Signals Over Hill

Microwaves act in many ways like light waves, and telephone engineers recently took advantage of that fact to "bounce" Tv signals over a hill with an aluminum "mirror."

A new video station, WNBC-TV, had asked the N. Y. Telephone Co. to provide a link between its Binghamton, N. Y., studio and its transmitter station on Inghram Hill, 3½ miles away. Land line facilities would have been unduly expensive, so the telephone company's engineers decided upon a microwave installation which beams Tv waves over a line-of-sight pathway.

The station's transmitter building is hidden behind the hill, but its antenna tower rises above the crest. The engineers mounted a dish-type microwave antenna on the roof of the telephone building in town and aimed it at the tower. Mounting a receiving "dish" on the electrically-energized tower would have posed certain insulating problems, but the engineers neatly sidestepped them. They attached a 7-foot-square aluminum "mirror" on the tower at an angle which would reflect the microwave beam down to a "dish" on the roof of the transmitter building behind the hill. This "mirror" has been "bouncing" the microwaves over Inghram Hill for several months, and all hands are agreed that the installation is a complete success.

Multiple Pay For Tv Film Actors

The Screen Actors Guild, in its negotiations with Tv networks and stations for a collective bargaining agreement for talent used in the production of motion pictures, will insist upon acceptance of the principle of payments to performers for the multiple use of films on Tv. No exact scale has yet been drafted.

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16-mm PROJECTIONS

U. S. Navy 16-mm Projection Specs

By Lieutenant-Commander JOHN J. McCORMICK

Motion Picture Film Exchange, United States Navy

Here, for all the world to see and digest (depending upon the state of their ideological stomachs) are the equipment requirements for aboardship projection of motion pictures. Professional projectionists the world over (a genuflection to our world-wide distribution) will find much of interest and not a little for speculative thought in this forthright exposition of technical requisites for projection equipment for the U. S. Armed Services.

THE increasing use of film by the U. S. Navy . . . has resulted in the development of motion picture projection equipment, both 35- and 16-mm, specifically designed to function satisfactorily at sea where the salt atmosphere renders normal equipment inoperative in a relatively short time. Further equipment ruggedization is needed as well to withstand the effects of vibration and the rough usage characteristic of all marine equipment, plus the fact that there is no repair shop around the corner from a Navy vessel when on duty. . . .

Insofar as 35-mm equipment was concerned, the problem of the Navy was exclusively that normal to the professional theater exhibitor. During the war, however, great difficulty was experienced in the handling of 35-mm film due to its bulk and to the fire hazard ever attendant when nitrate film is used. Also, it became obvious that the maximum size of picture which would be used aboardship would rarely be in excess of 12 feet wide, and it was therefore felt that 16-mm film could be used with the same effectiveness as the 35-mm film, if a projection equipment of sufficient ruggedness of design was developed.

35-mm Prints on Decline

Therefore, as time went on, more emphasis has been placed on procuring 16-mm prints for distribution throughout the Navy, with a continued reduction in the amount of 35-mm film used.

As 16-mm film has been utilized more widely, the factor of the disparity between projectors—with regard to their sound reproduction capabilities—became more apparent; and since the differences, projector to projector, are of such a wide nature, a stand was decided upon for the gauging of all film product.

Film product is now screened on the Navy Type IC/QEB 16-mm projection equipment, in conjunction with a standard theater two-way loudspeaker system.

In this manner the gauging of prints for satisfactory sound quality is brought up to the same standard as that of 35-mm product, from which 16-mm prints are made.

As a final criteria, it is possible to reproduce the 35-mm release print simultaneously with its 16-mm reduction print, and, also, in an A-B listening test determine what quality differences exist. We have found that if 16-mm film is processed correctly, that, at least audibly, no difference between the two film sizes can be detected.

Standard Conditions Stated

Of interest are some of the factors established as standard conditions for 16-mm equipment, as follows:

1. The projector is checked repeatedly for projection steadiness and picture jump and side weave is held to less than 2%, which is identical with that tolerance deemed acceptable for 35-mm product.
2. The picture brightness on the screen is held to a value of 5 foot-lamberts, which is a value somewhat less in recommended brightness to the 35-mm standard of 9 foot-lamberts. However, it is felt that, in the main, adequate contrast and good pictorial quality can be secured with the lower brightness level. The picture size for screening at this brightness in our review room is 6 x 8 feet.

A further factor of importance to the evaluation of 16-mm product is the character of the light source used, and here an important difference does exist, due to this fundamental fact: 35-mm in the past has been used for large screen sizes, with the resultant necessity for higher intensity light sources powered by the high-intensity arc. Therefore, color film for 35-mm exhibition is color-balanced to the high-intensity light source, it being the preponderant projection condition.*

* See "Monthly Chat," page 5.

This does not exist in 16-mm however, since here the ultimate end use is normal in conjunction with a Mazda light source. This makes mandatory, therefore, the timing of prints and color-balancing of prints to match this incandescent light source, a high-intensity arc being unsuitable for projection of 16-mm color.†

Standards Adherence Imperative

There is no doubt that if a higher intensity light source with the same identical characteristics as Mazda is developed, it will find wide use in the Navy. Its end use, however, will be to secure larger sizes of pictures rather than increased screen brightness, except in those cases where a high parasitical value of screen illumination exists on above-deck showing, due to bright moonlight, etc.

The attention of the producers of 16-

† Here IP makes the statement that there never was a motion picture "shot" with a carbon arc that did not project immeasurably better with the same type light source. Strong words these, but the statement that a projection of a 16-mm color print makes "mandatory" the use of a Mazda light source is a strong statement, founded neither in fact nor, inside the informed circle of motion picture engineers, even in fancy.



The U. S. Navy Type IC/QEB-1D 16-mm sound motion picture projection equipment, developed by DeVry Corp., Chicago. Equipment consists of 16-mm projector, 20-watt amplifier, and a 25-watt loudspeaker, each housed in a separate sturdy metal case. Special projector mounting bases are provided for booth installations. Chief characteristics of this new equipment are ruggedness, moderate weight, high illumination

output, high-fidelity sound, and its adaptability to a wide range of applications up to 'throws' of 180 feet. This equipment will replace existing 35-mm installations in U. S. Navy vessels.

mm prints is invited to the fact that we are now using edge-guiding in the Navy 16-mm equipment, which is designed to protect the sound track from scratching, a condition quite the reverse of what has existed in the past, wherein the edge-guiding was designed to allow the use of a maximum width shuttle tooth engagement with the film. In short, slit 32-mm film with adequate accuracy to maintain a steady picture on the screen, devoid of side weave.

There is also one further film dimension factor in our consideration of acceptable prints, which is that 16-mm film width cannot be in excess of 0.630 inch without the danger of interference in the film path caused by edge-guiding. We have found cases of film width in excess of 0.630 inch dimension. Since the standard film width is 0.630 inch, we should therefore have had no difficulty from film of off-standard dimension.

In the past, sound quality has been the largest obstacle to the professional use of 16-mm film, both in the projection and processing of film product. It follows, therefore, that before any basic improvement in print quality could become effectively noted, the projector itself would have to have qualities far in excess of those presently existing in 16-mm projection equipment.

To epitomize the reproductive capabilities of the Navy Type IC/QEB 16-mm equipment in a single descriptive term—sound quality—would be impossible. However, a measurement which in a sense describes qualitatively the entire equipment's sound performance, both from the standpoint of steadiness of film speed (flutter) and fidelity of reproduction, is that wherein the SMPTE 400-cycle signal-level test film (Z22.45) has been reproduced by the Navy's projector and amplifier at the 20 watts output level.

Optimum Measurement Procedure

A distortion analyzer was then connected to this electrical output, and the overall electrical distortion from film through the sound scanning system, the photocell and the amplifier was less than 3%. Not so long ago an amplifier of 6% overall distortion at its rated output was considered excellent. It can be realized from this test, then, that significant improvements have occurred due to the fact that it is now possible to make a film and equipment which, when used with each other, bring about a net result appreciably better than most amplifiers now being made.

The preceding relates to the performance of the equipment *when it is correctly maintained*. Obviously, any equipment so complex as a sound motion picture projector has to be serviced regularly so as to insure the best performance. Our equipment, therefore, is checked with the

SMPTE test reels to insure optimum performance.

Projection ala Oceanic

It may be seen from the preceding that with such excellent projection equipment the factor of the projector as the weakest link in the chain between producer and audience is now removed, and there no longer exists any significant reason why 16-mm film should not reproduce as well as 35-mm film. Further, we feel that the 16-mm sound motion picture equipment we now have in the Navy is in effect superior to most 35-mm equipment found in the average motion picture theater.

The review room at the Brooklyn Naval Shipyard is actually a small theater 57 feet long, 34 feet wide, and 16 feet high, with a screen size of 6 x 8 feet. It is acoustically treated to reduce the reverberation time to that which we would consider a normal projection condition. The equipment comprises Navy-Type IC/QEB units, in addition to 35-mm Simplex-type projectors. The 16-mm equipment has an electromagnetic changeover which is utilized to make rapid switching for A-B listening tests between the 35-mm release print and the 16-mm reduction print used for final distribution.



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NEWS PROJECTIONS

Jottings at happenings which, while mostly at a non-technical nature, have a bearing upon general industry welfare and progress.

GRIM warning that extraordinary precautions still are required when handling nitrate film was served when the Columbia exchange in Havana, Cuba, was destroyed by fire, induced by a "film explosion," shortly after IP went to press

last month. Eleven employees were burned or injured, and four adjoining buildings were severely damaged. . . . First quarter of 1950 net for Technicolor was \$632,984. Print costs have been cut, with nitrate stock down 1/2 cent per foot to 5.72 cents, and safety film pegged at 5.95 cents per foot. . . . National Screen Service trailers for Tv broadcast will cost \$35, complete with theater name and playdate. . . . Several score municipalities frustrated in plans to impose movie theater tax when, as and if the Federal tax was either lifted or reduced. . . . President Skouras informs stockholders that

Tv station volume is not yet sufficient to warrant production for that medium. Soon? . . . Giveaways and premiums, plus local merchant tie-ins, are spreading rapidly in the Mid-West area as a box-office tonic. . . . Despite survey figures to the contrary, several leading exhibitors assert that the Tv enthusiasts are won back to movie box-offices after a year of video set ownership.

Allen B. DuMont Labs net profit for 12 weeks ending March 26 last were \$1,967,000, which is 33% higher than for comparable period last year. . . . The FCC will lift the Tv "freeze" on new station construction "at the earliest practical date," said Commissioner Wayne Coy. . . . Paramount will release 12 "top" features during summer months, but four of these are reissues. . . . Metro is using 383 radio broadcasts a week over 97 stations in 47 key cities in an effort to boost movie attendance. . . . Prediction that there will be 50 large-screen theater Tv installations by the end of this year was made by Nat Halpern, Tv consultant for the Theater Owners of America. . . . National Theaters (West Coast) managers and other staffers will make ten personal door-to-door calls daily as aid to movie-going. . . . British Government asks that all unremittable American film earnings be devoted to either American production in England or to 10-year British bonds. Idea promptly rejected by Americans. . . . Fanchon & Marco, leading St. Louis exhibition group, has cut scales at its three first-run houses to 60 cents, including all taxes, with children under 12 accompanied by parents admitted free of charge.

Hollywood studio units during the past year shot 34 pictures wholly or in part in New York City, this being in addition to production by New York-based producing companies. . . . Final decision on color Tv can be expected from the FCC within three months, said John Battison, associate editor of *Tele-Tech* and an IP fan, in a recent speech. . . . Sharp cutback in advertising by movie companies a potent factor in box-office decline, says Audience Research, Inc. . . . Uncle Sam's total take from entertainment ticket taxes thus far in its fiscal year is about \$12 million less than comparable period a year ago. . . . Signs of the times: marking a "first" for the area, UA's "Love Happy" made its first-run bow in three drive-in theaters rather than in a conventional theater. . . . National Association of Broadcasters has formed group for intensive study of costs for Tv film. Move inspired by continuing Hollywood refusal to make such films. . . . And reduction in the admissions ticket excise tax will not be effective until September or October, maybe later. . . . Movie theater summer wage cuts again be asked on a "temporary" basis. "Temporary" has unfailingly in the past been translated into "permanent."

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An Electrical Analog for the Mechanism of Hearing

By Staff Members of Bell Telephone Laboratories

MOST people are perfectly content with the knowledge that they can hear the myriad and diverse sounds which go to make up a sound pattern which impinges upon their consciousness, but very few know or seem to care much about the manner in which this process is accomplished nor about the remarkable human mechanism which permits auditory perception—the ear.

A schematic cross-section of the human ear—and, as is customary, a distinction is made between the external, middle and internal ear—is shown in Fig. 1. The auditory organ proper is the inner ear, more specifically the cochlea, a canal of helical form embedded in the petrous part of the temporal bone.

Midway across this canal is a thin membrane, the so-called basilar membrane, along which the end organs of the auditory nerve terminate. The two canal halves thus formed are filled with liquid. They are interconnected at the far end of the cochlea by a small aperture, the helicotrema.

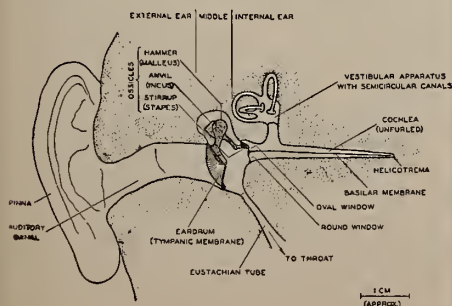
In Fig. 1 the cochlea is shown unfurled for clarity, and for simplicity no reference is made to the cochlear duct and associated organs.

Transmission, Pressure Equalization

At the other end of the cochlea there are two apertures, one on each side of the basilar membrane. The lowermost, the round window, is closed by a membrane, whereas the other, the oval window, accommodates the footplate of the stirrup, the final link in the ossicular chain.

This chain, consisting of hammer, anvil and stirrup, transmits vibrations of the tympanic membrane to the liquid filling the cochlea. The Eustachian tube provides equalization of steady pressure between the two sides of the ear drum. The vestibular apparatus, also shown schematically in Fig. 1, acts as the organ of equilibrium by utilizing the three semi-circular canals which are oriented in

FIG. 1. Schematic cross-section through the human ear, for the inner chamber of which an electrical analog has now been developed.

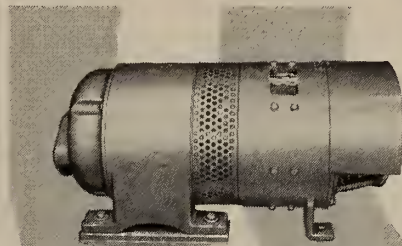


three approximately orthogonal planes.

When the ear is exposed to sound of a given frequency, the sound pressure in the auditory canal activates the eardrum whose vibrations are transmitted through the ossicles to the cochlea. Wave motion is set up in the liquid of the cochlea in such a way that the deflections on the basilar membrane are localized in a certain area.

For higher frequency sound the area of maximum deflection on the basilar membrane is shifted towards the oval window and different end organs of the auditory nerve are stimulated. As the magnitude of the stimulus is increased, the deflections of the basilar membrane increase in magnitude and the stimulation of the nerve endings is increased correspondingly.

The functions of the outer ear, consisting of the pinna and the auditory canal and terminated by the eardrum, is to serve as a transducer and pressure am-



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This latest Hertner development provides an unexcelled power supply for the new type National Excelite 55,000 lamps for drive-in and large theatres at extremely low operating cost.

The "HS" Transverter, equipped with a 20 H.P. motor operating at safe, slow speed of 1750 R.P.M., incorporates all of the outstanding characteristics of other Hertner Transverter models, as well as a new power conversion application for the new type lamps and carbons. The 75-volt generator is extremely economical for operating carbons at 50 to 63 volts. This Transverter also incorporates sufficient amperage output rating for 115 amperes with an ample capacity for 230 ampere changeover—rating somewhat higher than the original 90 ampere rating for 8 and 9 mm. carbons. This additional capacity gives the "HS" Transverter a greater range of flexibility.

The entire power supply equipment for the new lamp consists of the "HS" Transverter, control panel type "G" and the new "HSD" ballast rheostat. Write for Bulletin No. 301-A.

... with Dual Projection Arc Rheostat

The 5 to 51 volt range of this new "HSD" dual-ballast rheostat with 65 to 100 ampere rating is designed to cover the entire range through 9 and 10 positive carbons for the new lamp, as well as making the "HSD" rheostat adaptable for various other Transverter and carbon applications.



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plifier interposed between an external sound field and the delicate and small structures of the middle and inner ear. The magnitude of the stimulus acting on the auditory apparatus can be quantitatively evaluated by a measurement of the sound pressure at some convenient point in the auditory canal.

The combination of precise physiological knowledge and expert application of modern test instruments enables communications experts such as those in Bell Telephone Laboratories to accurately appraise every speech level from that of a whisper to ear-shattering tonal sonorities. Thus is the communications art advanced.

Electrical Analog Developed

An electrical network that stimulates the mechanical action of the inner ear has been designed and built by members of the Transmission Research Department to solve a mathematical equation that occurs in a theory of hearing originated by L. C. Peterson. It provides

means for checking the mathematical theory under various conditions more readily than is possible by numerical calculations. Duplicating the action of the cochlea of the inner ear, the network sorts out the frequencies present in the sound waves entering it, causing them to appear at different places along the network.

The cochlea, which looks like a tiny snail shell, transforms the sounds entering it into electrical impulses in the thousands of nerves leading into the brain. It consists of two channels separated along their length by the basilar membrane, which moves under the influence of the sound pressures.

Each region along the membrane responds readily only to a range of frequencies: the nearer end responding to

the higher frequencies and the farther end to the lower, with intermediate frequencies affecting intermediate positions. Tiny hair cells embedded in the membrane send out electrical impulses that are carried to the brain by the auditory nerve. More impulses are sent where the motion of the membrane is greatest, so that the cochlea acts as a crude frequency analyzer.

Wide Frequency Range

In detail, the network built to reproduce this action is a transmission line of 175 sections, each section being composed of inductors and capacitors. The values of the components differ from section to section in the same manner as the mechanical constants of the cochlea. The shunt element in each section corresponds to the basilar membrane, and is a series resonant circuit, the resonant frequency ranging from about 17,000 cycles at the first section to 500 cycles at the 175th section.

The voltages at various points along the line correspond to the amplitude of motion of corresponding points along the basilar membrane. These voltages are available at jacks for analysis. Measurements made show reasonably good agreement with observations on the cochlea.



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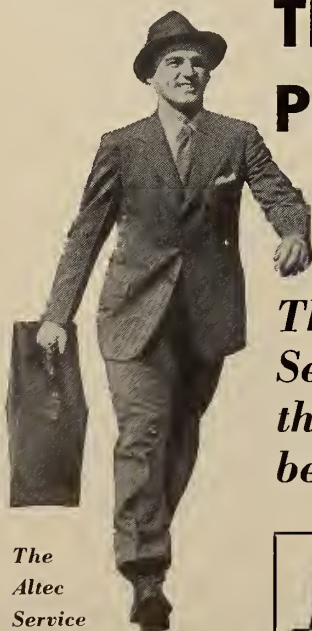
Smart Theater Showmanship?

Feature playing the Loew's Circuit in N. Y. City recently was sliced by 1100 feet (12½ minutes) so that its running time would not require overtime payment to house staffs.

"Samson and Delilah," Cecil B. DeMille opus hailed as one of the "greatest" films ever made (producer-exhibitor advertising) had its entire opening "mood" and finale music eliminated. Still, the Loew circuit played the feature at advanced admission prices.

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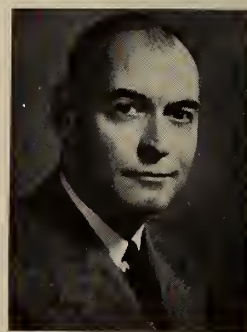


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PROTECTING THE THEATRE—FIRST PLACE IN ENTERTAINMENT

A. S. Johnson Now General Manager of National Carbon

A. S. Johnson has been appointed General Manager of the National Carbon Division of Union Carbide and Carbon Corp. Johnson joined the organization in 1928 at the Edgewater Plant in Cleveland. He went to China in 1933 to assist in plant operations in that country, returning to the United States in 1939 as



A. S. Johnson,
recently named
General Manager
of National
Carbon Co.

Assistant Superintendent of the organization's Fostoria, Ohio, plant. In March, 1942, he became Superintendent of the Clarksburg, West Virginia, plant, and later that year went to Cleveland as District Manager.

In 1944, Johnson became Assistant to the Vice President in Charge of Production, with offices in Cleveland. In 1945 he was transferred to New York to the Foreign Department of the organization, and in 1948 was made a Vice President. Johnson is a native of Blacksburg, Va.

British Filmites Moan; Unions May Sponsor Production

That the U. S. film industry was not alone in its "recession" phase was confirmed by a recent despatch from London detailing late developments in the United Kingdom. The outstanding disappointment to British filmites was the failure of the Government to ease the entertainment tax.

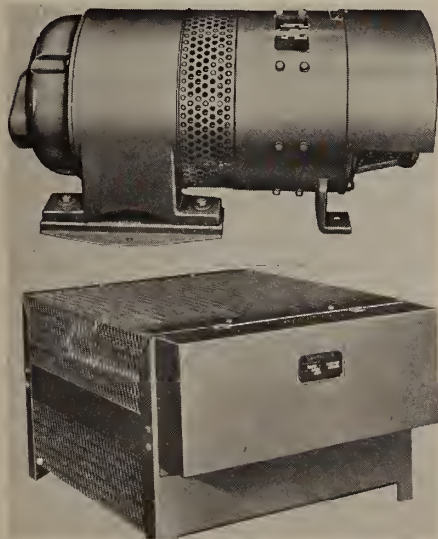
Another point of interest was the possibility of stage shows being introduced in motion picture theaters with the resulting blow to producers of second features. After August 5 next, if a stage show takes up at least one-fourth of the theater program, the entertainment tax will be slashed by 85%! However, it is not expected that many motion picture theaters will be in a position to add stage shows.

For the first time in the United Kingdom, a labor union (Cine-Technicians Union) is planning to produce films and thereby relieve unemployment. Some British film stars, producers, actors, directors, and writers have subscribed to the plan and will reportedly work for less than their usual income. The first film is entitled "Green Grow the Bushes" estimated to cost about \$350,000. Other unions have indicated approval of the plan and have intimated that they might do the same.

New High-Rating Transverter

A new power supply unit designed for use with the new Strong "Mighty Ninety" or Excelite 55,000-type lamps in drive-in and large theaters has just been announced by The Hertner Electric Co. Known as the Type "HS" Transverter, it incorporates all of the outstanding characteristics of other Transverter models as

NEW HERTNER TYPE 'HS' TRANSVERTER



Latest Hertner development for drive-in and large theaters. At top is the "HS" motor generator, and at bottom the "HSD" rheostat.

well as a new power conversion application for the new type lamps and carbons.

The "HS" Transverter is equipped with a 20 H.P. motor operating at 1750 r.p.m., and a 75-volt generator. The generator is extremely economical for operating carbons at from 50 to 63 volts. This new Transverter incorporates sufficient amperage output rating for 115 amperes, with an ample capacity for a 230-ampere changeover, thus providing greater range of flexibility.

The entire power supply equipment for the new lamp consists of the "HS" Transverter motor generator set, a control panel, and a new "HSD" dual ballast rheostat with 5- to 51-volt range with a 65- to 100-ampere rating.

Bulletin No. 301-A, describing the "HS" Transverter, is available from Hertner at 12,690 Elmwood Ave., Cleveland 11, Ohio.

Continental Electric Expands Line

Continental Electric Co., of Geneva, Illinois, which assertedly supplies 91% of all the phototubes used by 16-mm projector manufacturers, has been reorganized under the presidency of H. A. McIllvaine, who founded the company more than 20 years ago.

These cells, marketed under the trade name of "Cetron," will be included in a manufacturing schedule which will embrace the production of Thyatron, rectifiers, classified products for the Armed Forces, cold-cathode fluorescent tubes, bactericidal lamps, vacuum gauges, blueprint machines, and the like.

Twentieth Century-Fox plans for large-screen Tv projection will embrace about 20 theaters in the company's West Coast division. Expenditures for RCA equipment is expected to total \$2 million.

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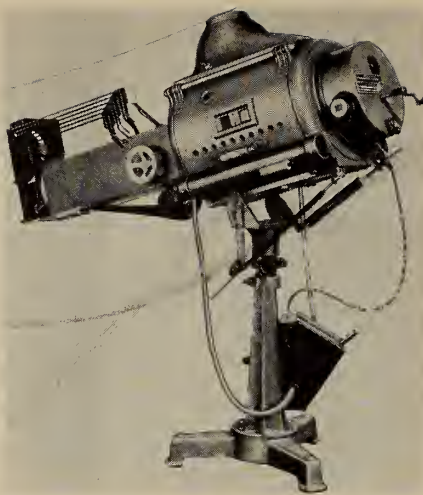
WITH ANY LAMP IN ANY SIZE THEATRE

The Metro-Lite H. I. Spotlight

Following successful operation in the arena-auditorium field throughout America, the new Metro-Lite heavy-duty spotlight was put through its paces recently at a demonstration staged for IP representatives.

This spotlight, rated at 125 amperes and pulling 55-60 arc volts, burns a White Flame 13.6-mm positive carbon and a 7/16-inch Orotip negative. The positive carbon is automatically rotated and is fed by feed rollers. The negative carbon is controlled by a ratio feed off a step-clutch. A hand feed is provided for emergency use.

The wheels and lighting effect levers are conveniently located on the left side of the lamp. A single wheel automatically focuses the spot, opens the inside iris, and controls the size of the spot. The delicately balanced lamphouse permits one-hand control and easy following of the fastest action. The wide tilting angle permits projection from pit to an



The 'Metro-Lite' high-intensity carbon arc spotlight, pulling 125 amps at 60 volts.

aerial act. The housing is balanced with springs and will lock in any position.

4-Element Optics, Wide Range

A modern four-element optical system

enables a range of "throw" from 100 to 400 feet. This system enables a gradual extension of spot diameter: for example, at a 200-foot throw the range is from a small 36-inch spot up to a spot 60 feet in diameter. The 6-inch fading iris gives a gradual dimming of the light from total brightness to total darkness. A square shutter permits projection of rectangular shapes.

A box of 6 color frames and an ultra-violet frame for "black-light" effects is provided. Cooling of the gelatins is accomplished by a powerful blower motor. The spotlight is manufactured by Genarco, Inc., at 36-56 Thirty-fourth St., Long Island City 6, N. Y.

Wants Back Copies of IP, Others

Anton F. Burns, 10,740 Woodbine St., Los Angeles, Calif., requires a copy of IP for May, 1932, in order to complete his file. He also requires the following copies of "Motion Picture Projectionist": Nov., 1927; Feb., April, May, July for 1928. Burns will pay \$1 and postage for each copy received.

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16-mm Equipment Boom—RCA

The widespread use of 16-mm sound motion picture projectors by such diverse groups as day nurseries, labor unions, dairies, railroads, advertising agencies, television studios, airlines, community clubs, and government agencies is reported by RCA after an analysis of recent sales.

Although the use of 16-mm projectors for instruction and entertainment by schools and churches still leads the field, application of this equipment as an advertising, sales promotion, and public relations medium has increased greatly. General business is also adopting the equipment as an important tool in job and sales training, safety instruction, and scientific investigation.

CBS Extends 'Live' Tv Network

Live program Tv network will be extended as far south as Birmingham and as far west as Omaha by Sept. 30 next as the result of an order for coaxial cable facilities placed by CBS with AT&T. Cities to be added to the web include Jacksonville, Charlotte, Greensboro, Atlanta, Richmond, Birmingham, Minneapolis, Rock Island, Davenport, Des Moines, Kansas City and Omaha.

Painter Joins Da-Lite Screen Staff

Merle E. Painter has been named sales promotion manager for Da-Lite Screen Co., of Chicago, and will assist Gil Heck, recently appointed sales manager, in providing point-of-sale help to dealers. Da-Lite recently produced its two millionth projection screen.

Sound Screen Brevities

All types of sound screens undergo a steady deterioration from the day they are made. . . . In many territories certain gases in the air tend to speed up disintegration or evaporation of the chemicals and thus contribute to discoloration. . . . Light-reflecting properties of sound screens deteriorate at an average rate of 4% per month. . . . Even a single resurfacing leaves a sound screen appreciably worse from a sound-transmission standpoint than when it was new. Likewise, the reflection characteristics never approach the original.

One of the first Daguerre cameras sold in the United States is among the historical exhibits at George Eastman House, the photographic center in Rochester, N. Y. Also a copy of the first book illustrated with photographs—a collector's prize—is on display. The book is "The Pencil of Nature," published by W. H. Fox Talbot in England in 1844.

OPTICAL ALIGNMENT CHECK

(Continued from page 19)

at a light-field balance. Here again the best working distance may appear wrong if the optical train is not in true alignment, and care must be taken to insure that the lamphouse movements are all along, and in no part cross-wise of, the optic axis as previously aligned.

Crater-to-Mirror Adjustment

As has been stated, the gas ball of the carbon arc may be considered as a flat disc with bluish arc stream in front and a yellowish shell to the rear. If the alignment distances, mirror-to-film-plane and mirror-to-arc, are correct, the pure white light of the gas ball disc will be focused on the film plane and in turn on the screen by the projection lens.

Within its white-light range, when using a 7-mm Suprex positive carbon at 45 amperes, this disc may be considered as having a thickness of roughly $\frac{1}{8}$ to $\frac{5}{32}$ inch, and, depending upon its area

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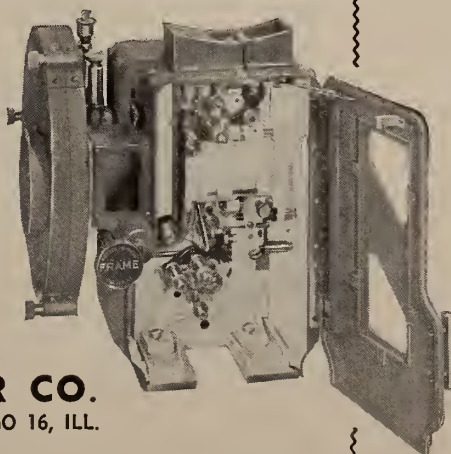
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and relationship to the mirror magnification, it is possible to vary total screen light as much as 25% from maximum and still remain within the white-light range by moving the arc toward or away from the mirror. The larger the carbon for a given mirror magnification, the greater this leeway of movement will be.*

As the arc is moved toward the mirror, the spot on the aperture plate becomes larger, the screen light distribution more flat, and the total screen light is reduced. As the arc is moved away from the mirror, the spot on the aperture becomes smaller, the sides-to-center light distribution ratio becomes greater, and the overall screen light is increased.

A satisfactory method of arriving at the best arc-to-mirror position is to move the arc toward the mirror until the screen light becomes yellowish; then reverse the procedure until the light on the screen begins to turn blue; then move back from the blue zone just sufficiently to obtain a satisfactory side-to-center distribution, bearing in mind that in flattening the field you are reducing overall screen light.

It is readily seen that if the crater gas ball is not facing the mirror correctly, it may not be possible to clear the light field at anything like maximum screen light. Therefore, if the plane of the crater is allowed to shift because of a short grip in the holder, or burned carbon-savers, the probable result is that the projectionist, in attempting to operate where the least off-color light is noticed on the screen, has set mirror-to-arc position where the maximum-sized spot is obtained on the aperture plate, and so at minimum light within the white-light range.

Crater Size vs. Mirror Magnification

It is obvious that inasmuch as the mirror magnifies an image of the crater on the aperture, the larger the crater the better the coverage. Substitution of a bigger carbon at the current designed for a smaller one, however, cannot be so simply done. While the economics and seemingly better coverage may favor the larger carbon, it must be borne in mind that it is the crater diameter and light distribution across the crater face that governs the usable light, and not the overall diameter of the unburned carbon electrode.

A 6-mm Suprex positive carbon cannot be satisfactorily used in a standard Suprex lamp designed for larger carbons because, even at maximum current, its crater size is not sufficient to give adequate aperture coverage. If for reasons of lower light requirements the use of a 6-mm Suprex positive were indicated, it

would be necessary to produce a mirror of greater magnification which would further reduce the light at the film plane.

This same difficulty comes into play when attempting to use a larger-than-normal trim at below its rated current. It not only becomes unstable from lack of power, but the overall screen color as well as screen light suffers by comparison with a properly burned trim because the reduction in power input has also reduced the *effective size* of the crater.

A typical example of the foregoing is the 1-kw lamp where the mirror magnification has been increased to provide coverage with a 7-mm Suprex positive carbon at 40 amperes and 28.5 arc volts.

With a knowledge of the factors discussed herein, it should now be possible to utilize a systematic procedure for optical train alignment and adjustment, and in so doing to avoid the confusion which often takes place in any system where the movement of one element affects the performance of another. Such a check procedure is summarized as follows:

1. With suitable alignment tools align the lamphouse and burner mechanism in accordance with the instructions accompanying the tools.
2. Check numbers on mirror with manufacturer's specifications to determine correct working distance, then move the lamp on the base to within $\frac{1}{2}$ inch, plus or minus, of the suggested distance.
3. Set the arc at the manufacturer's recommended arc-to-mirror distance.

4. Strike the arc and by means of the lateral and vertical mirror adjustment knobs clear the field as much as possible.

5. Explore the arc-to-mirror distance by moving the arc toward the mirror until the screen light becomes yellow; then away from the mirror until the screen light becomes blue; then toward the mirror again just into the white light zone where there is not too much fall-off at the edges of the screen.

6. Secure lamp to base and recheck No. 1.

7. The position of the optical center of the mirror to the center of the crater will usually be found to be satisfactory, but it can be checked roughly by measuring from edge of crater to outside edge of mirror at four equidistant points around the mirror circumference.

8. Check position of fire shutter and automatic dowsers with projector running. It is not sufficient that these raise sufficiently to clear the top edge of the film; they must also clear the entire light cone angle, from mirror to aperture.

While this procedure may seem to be tedious, it is well justified by the results obtained, particularly so when it is realized that *the picture is light*.

Only the procedures described here are effective in putting *light* on the screen. The film itself can only operate to take some of this light away, so as to leave a desired pattern. It is up to the projectionist to do his part in creating this pattern.

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* For further information see p. 55, "National" Projector Carbon Handbook, Fourth Edition, 1948.

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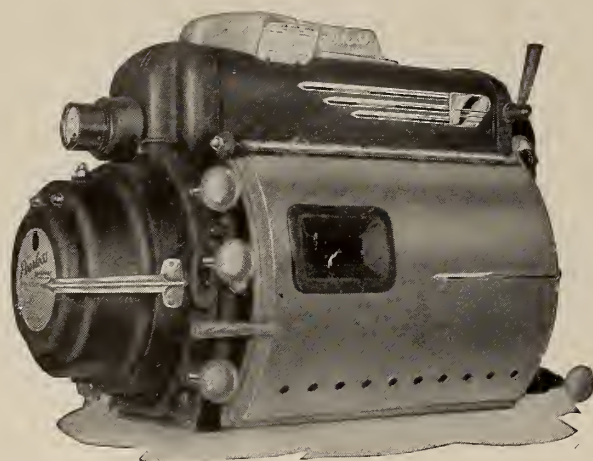
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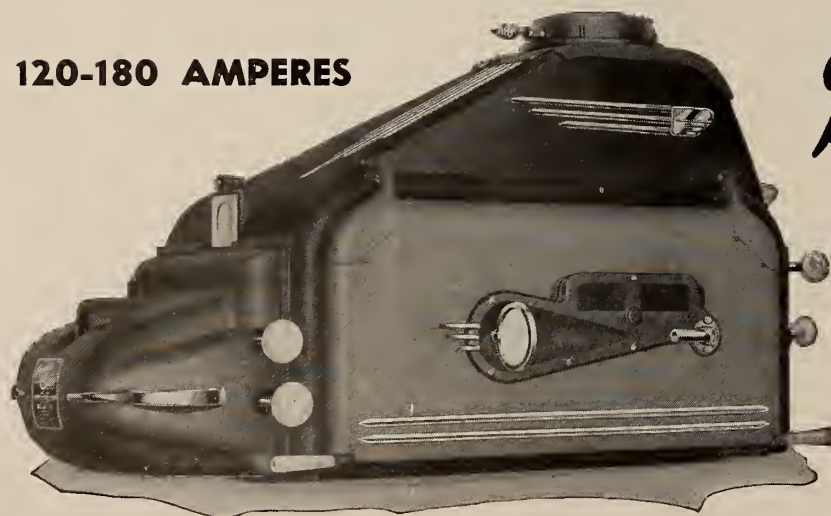
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HENRY B. SELLWOOD, *Editor*

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JULY 1950

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MONTHLY CHAT

MULTI-LAYER interference coatings for reflector mirrors and other heat-dissipating and heat-resistant units for use with high-intensity carbon arcs have stirred considerable interest among projection technicians, who see in such devices a possible means for licking the problem of excessive heat on the film.^{1,2}

Eastman Kodak has announced a process for coating a reflector mirror so that it *reflects* most of the light but *transmits* nearly all of the heat. Fish-Schurman Corp. utilizes the same coating principle for its filter discs which, mounted at normal incidence before the arc, is said to pass about 90% of the useful light while it deflects up to 60% of the heat-giving rays. The basic idea of both these systems is all to the good—but what about their practical application?

First, the Eastman process is strictly in the experimental stage, as were similar projects initiated in Germany before World War II. It is understood that Eastman does not intend to engage in any large-scale production of such units, but probably would supply technical data to other manufacturers. To make such mirrors, however, would require the installation of large vacuum bulbs and pumps, the cost of which would be prohibitive.

For example, to coat a 14-inch mirror by this process would mean a selling price of at least \$150 per mirror. Then, too, there is some question as to the ability of these coatings to withstand high heat levels and ordinary usage without wearing off.

The Fish-Schurman heat-filter discs, now in high favor in the studios where they are used with arcs in the 240-amp range, now sell for \$60 per unit; but it is expected that increasing sales will up production to where the units will sell for about \$30, thus making the over-all cost to the theater \$60.

Our guess is that, considering the economic condition of most theaters today, getting this kind of money would be almost as difficult a task as is the production of the units. Still, a stand-still attitude will not advance the projection field one inch forward in its tussle with the problem of excessive heat on the film.

Almost a year has passed since IP presented its widely-acclaimed symposium on methods for overcoming this problem, but there still is no sign of joint action on the part of the manufacturers of projectors, lamps and carbons to go forward by pooling their resources in a sincere effort to come up with the right answer. Everybody goes his own way, and the devil take the hindmost. IP again appeals to these manufacturers to get together and do something for the projection field which has done so much for them.

¹ "Heat, Light Reflectivity . . . Kodak Mirror"; IP for June, 1950, p. 11.

² "The FS Multi-Layer Heat Deflector"; p. 22 of this issue.



THE STRONGEST MATERIAL

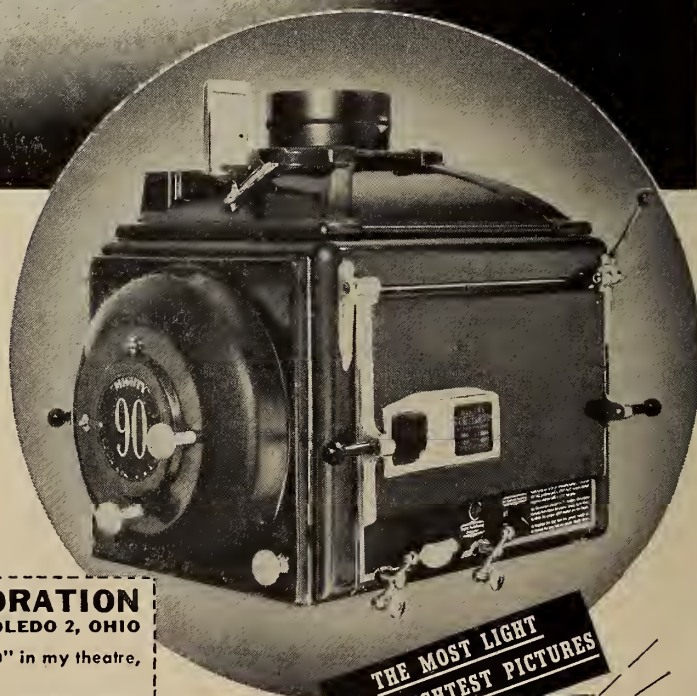
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Notes on Modern Projector Design

THE opinion was ventured in the preceding installment that a projector mechanism need not be extremely complicated, nor need any of its parts be difficult of access. Simplification, not complication, is the keynote of modern projector design. The trend toward simplification is most apparent in all the new American projectors; designers in other countries, by and large, have not approached the problems of simplification as successfully as have American manufacturers. Modern American design has rendered maintenance and operation easier and perfect screen results more certain.

Convenient accessibility of all parts is a hallmark of modern design. Certain parts—such as intermittent sprockets, star wheels, gate shoes, guide rollers, tension pads, *etc.*—wear out after long periods of use, and accordingly need to be replaced from time to time in order to keep the machine in first-class condition. Other units, while normally much more resistant to wear, are liable to breakdown from accidental causes, and may require emergency replacement. Prompt and accurate replacement of parts has always been of paramount importance.

Those days are over when a projector has to be practically dismantled to replace an intermittent sprocket—a part which is expected to show signs of wear after a few years of daily use. Although it is not really difficult to assemble either a single- or a double-bearing intermittent, much time is consumed in making the delicate star-and-cam adjustment. It has to be *just right*. Doesn't it seem un-

By ROBERT A. MITCHELL

III.

necessary to require the projectionist to go to such lengths merely to change or reverse the sprocket?

This vexing problem is licked in the Brenkert models 40, 60, and 80 by employing a sturdy modification of the single-bearing type of mounting, and in the Simplex X-L and the Motiograph AA by using a removable outboard bearing in a double-bearing construction.

Unit Construction to Fore

"Unit construction" still is another manifestation of the trend toward convenient serviceability. Various assemblies are separately removable, and are easily restored to correct position without the use of special tools. Servicing thus becomes a light chore instead of a major operation which exhausts the patience of even the best-natured projectionist.

Modern conceptions of sound design are also seen in the gearing of the latest American projectors. The use of spiral drive gearing in certain machines, and a minimum number of massive steel and phenolic helical-cut gears on others, are a definite contribution to quiet, trouble-free operation, freedom from excessive backlash, and greatly reduced mechanical load. Extreme simplification of the gear train is seen in the Superior A mechanism.

Chain drives have been a bone of contention for many years, much of the difference of opinion being due to mis-

understanding. The vertical-tooth type of chain used in the DeVry projector is actually a *flexible gear*. It is not like a bicycle chain. The DeVry chain has the flexibility of a belt and the positive action of gearing. It is more efficient than ordinary gearing, however, for it engages teeth over a considerable portion of the circumference of each gear, instead of just two or three teeth. This makes for very smooth operation and practically eliminates the danger of gear-stripping.

Bicycle-Type Roller Chains

The B.T.H. SUPA projector, on the other hand, employs bicycle-type *roller chains*. American opinion is that roller chains are unsatisfactory in precision machinery. They become noisy when the chain sprockets are only slightly worn, as all users of the old-style projector bases having a roller-chain drive for the lower magazine takeup are well aware.

In a projector mechanism, roller chains unavoidably create vibration and transmit flutter to the film sprockets, shutter shaft, and intermittent movement. The vertical-tooth *gear chain* is entirely free from these defects.

Automatic lubrication is another interesting characteristic of modern projector design. Although long employed in many projectors of European manufacture and in the American Brenkert, the increasingly frequent appearance of pre-greased ball-bearings and improved self-oiling systems in American projectors reduces markedly the tedium of the projectionist's daily routine with the oil can. High time, we say, to eliminate the hundred-and-one individual oiling points

and the danger of bearings running dry. And the complete freedom of the operating side of the projector mechanism from superfluous lubricant, which in times past was a frequent cause of soiled film and fogged projection and sound lenses, is another superior characteristic of American design.

The ultimate of perfection in the construction of the aperture gate, or film-trap, is rapidly being approached. Extra-long film runners and tension pads stabilize the position of the film and assure positive action of the lateral guides and freedom from film-slap between the intermittent sprocket and the aperture. Auxiliary "framing apertures" have been introduced into the gates of several American projectors to facilitate threading.

Lateral Film Guiding

Various methods of lateral film-guiding have been utilized by different manufacturers, but all retain the time-tested flanged guide roller in more or less its original form. The use of guide rails in addition to the lateral guide rollers, however, seems superfluous, for it is difficult to understand how both lateral-guiding devices can function together harmoniously.

We might ask, how much guiding action does the outer guide rail exert? Or, does not the inner guide rail strain the film if the flange roller is set in toward the gear side of the machine a few thousandths of an inch too far? If the guide rails do not actually guide the film, why have them at all? If they do, why have a guide roller?

It appears to the writer that a set of two flanged guide rollers, one at the top of the gate and the other about an inch above the aperture, provides the best solution to the problem of side-sway. But no projector having this type of guiding rig has as yet come to the writer's attention.

The buckling of film in the gate from various causes has been considered by both projectionists and manufacturers as one of the unavoidable faults of projection ever since the earliest days of the art. Buckling, in its several forms, is responsible for both focus drift and image flutter.

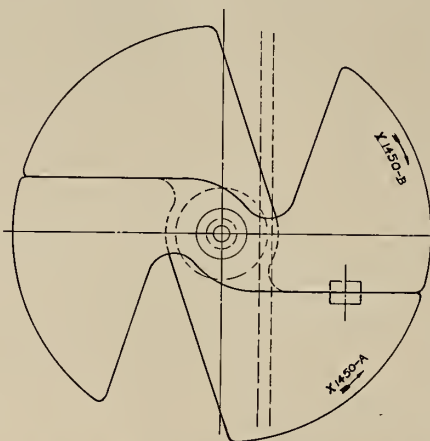
Curved Gates Overcome Buckling

Film drift is said to be *negative* when the center of the frame bulges out in the direction of the lamphouse, and *positive* when it bulges toward the lens. Negative drift is the normal direction in 35-mm projection. A constant degree of bulge prevents a sharp focus from being obtained over all areas of the screen (if excessive), and a rapid in-and-out fluttering of the film in the aperture is very deleterious to good screen images. Readjustment of the gate tension fails to eliminate buckling.

Now, the evil of film buckling is characteristic of *flat* film gates. Projectors designed for showing Grandeur film—an experimental 70-mm film of 1930—overcame buckling by the use of film gates *slightly curved* longitudinally. Curved gates, the reader will recall, are nothing new in soundheads. They were a standard fixture in most of the old-style soundheads; and in present-day reproducers using rotary scanning drums, the wrap of the film serves the purpose of a curved gate.

Why not curved picture gates for regular 35-mm mechanisms and thus practically eliminate buckling, which is admittedly becoming more serious with the increasingly widespread use of extremely high-powered arcs? The B.T.H. SUPA and the SUPA Mark II do indeed utilize curved picture gates, and this one feature may prove to be the saving grace of those otherwise primitive machines.

The SUPA gate holds the film slightly *concave* to the lens; and the curvature, which is less than the curvature of moderately buckled film in a flat gate, is the



Brenkert BX 100 projector shutter blades and aperture layout.

amount recommended by lens manufacturers (British). The movable part of this gate swings open toward the lens, and carries aperture and film runners. The stationary component carries the spring tension pads.

Curved Gate ala American

To incorporate such a curved gate in an American projector of conventional design would require transfer of the steel runners and aperture to the gate door, and the placement of concave tension pads in what is now the aperture-carrying main frame of the film trap. Still

Back Copies of IP Wanted

One of the leading research laboratories in the visual-audio field is most desirous of obtaining copies of IP for both February and November, 1946. Anyone having these two back issues will please notify IP before forwarding the copies.

better would be conversion of the door to the stationary component. It is interesting to note that the convexity of the Grandeur gate (the mechanism was a modified Super Simplex) faced toward the lens. From an optical point of view, the curved gate should be concave, not convex, toward the lens.

Nevertheless, the writer confesses a wistful glance at the Grandeur projector, seeing in it many excellent features which could have been, *and should have been*, improved and incorporated into all 35-mm mechanisms, *viz.*, the curved film gate and the amalgamation of picture and sound units into one mechanism. For that matter, the Powers 5-to-1 pin-cross intermittent movement should have displaced the 3-to-1 Geneva movement, but Fate decreed otherwise. Alas, what should have been and is not!

Various Cooling Methods


Any mention of projector gates brings up the much debated matter of cooling methods; and once again we run smack into manufacturer short-sightedness. Water-cooled gates, air blasts, and heat filters are well known to European projection practice—as are also non-conductive gate runners.* A few American designers are just beginning to perceive the fact that heating of the film, both by conduction from hot metal and by direct irradiation, is one of exhibition's biggest headaches. DeVry and Century deserve special congratulations for the real progress they have made along this line.

Modern projector designing cannot overlook the fact that modern "fast" lenses are really huge. An F:1.9 lens has a diameter of from 3¼ to 3¾ inches. Any mechanism which cannot accommodate lenses having speeds up to F:15-lenses which are absolutely necessary for brighter, more evenly illuminated screen images—is behind the times in one respect, at least.

The Germans developed F:1.9 projection lenses and large lens mounts more than 15 years ago; but German preeminence in the optical field has now definitely passed to the United States. Petzval Neokino lenses by Busch; Diaprojektionsobjektiver and Trioplan by Meyer; and Alinars, Kinostars, Kipronars, and Kipro-Anastigmats by Zeiss, once the world's best, are now surpassed in quality performance by Super-Snaplites by Kollmorgen and Super Cinephors by Bausch and Lomb. There may indeed be nothing new under the sun, but the old, we find, can always be improved upon.

* The Ernemann velvet-ribbon runners were intended primarily only for use with new *unwaxed* prints to avoid "sticking" and consequent film damage. Actually, however, the velvet runners are used practically all of the time in European theaters having arcs which draw current in excess of 50 or 60 amps. Velvet, being a comparatively poor conductor of heat, helps keep the film cool by preventing excessive conduction of heat to the perforation margins of the film.

[To be Concluded]



Giant, Twin Open-Air Theatres Switch to "National" "Hitex" Carbons!

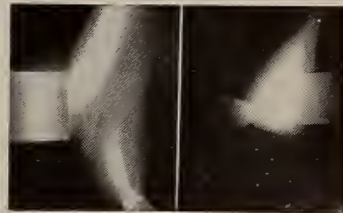
The Twin Open-Air Theatres in Oak Lawn, Illinois, wishing to give their patrons the finest, brightest projection available, are now using "National" "Hitex" Super High Intensity projector carbons.

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X-L

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and Wally should know, because he supervised the test operation of the Simplex X-L mechanism in this ace M-G-M showcase.

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Thank you, Wally Byrne . . . your opinion is shared by hundreds of other top-flight projectionists from coast to coast.

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Distributed by National Theatre Supply

FOR centuries man observed how light rays bend as they pass from air into water or from air into glass. Hundreds of men of an investigative turn of mind made observations and measurements in an effort to determine just what relationship exists between light rays before and after refraction.

Although the bending of light is easy enough to observe, and although the actual measuring of the angles of the light rays affords no particular difficulty, the true explanation of what causes the bending and the method of precisely determining its extent were not found until comparatively modern times. From the days of Claudius Ptolemy, in the second century of the Christian era, until the 17th century, men observed the phenomena, or facts, of refraction, and from these facts tried to derive some rule or relationship that would enable them to tell in advance just what direction a given ray would take under given circumstances and which would co-ordinate all of the facts that had been observed.

Mathematical Exposition of Law

The true explanation was not made until about 1621, when Willebrord Snell of the University of Leyden, in Holland, discovered what is now known as the Law of Refraction. Stated mathematically, the Law of Refraction is this:

The sines of the angles of incidence and of refraction are in a constant ratio, which is the same as the ratio of the refractive indices.

Unimportant though it may appear, this statement is really one of the greatest scientific discoveries of all time. It is like a key that unlocks the door to a world of wonder and beauty never before dreamed of. To anyone who does not use the key it may seem like a small and insignificant thing in itself because it gives no hint of the knowledge and beauty it is capable of creating. Yet Snell's Law of Refraction has made optical science possible. It has reduced problems of lens and instrument design to mathematical certainty. It is directly responsible for the modern spectacle lens, with its untold blessings to mankind. It

Refractive Index of Glass

Willebrord Snell's Law of Refraction, discovered in 1621—a law basic to the whole science of optics—makes possible the precise mathematical computation of modern lenses and optical instruments.

By SCOTT STERLING

Member, Scientific Bureau
Bausch & Lomb Optical Company

has made possible the modern microscope, mighty conqueror of diseases; the telescope, which has revealed new worlds to us; and the photographic camera, one of the most powerful means of conveying information, and of recording human progress, that has yet been devised by man.

It is true that both the microscope and the telescope were invented before Snell's Law of Refraction had been formulated. Huygens, a great scientist of the 17th century, and the originator of the wave-theory of light, said: "To devise the telescope merely by thinking, and by the application of geometrical principles, without the help of a fortunate accident, a man would have to be super-human."

This would indeed be true without a knowledge of the Law of Refraction, but with the accidental discovery of the telescope to begin with, and the Law of Refraction to explain its operation, the whole field of optical science was made possible.

Refractive Index of Glass

The refractive index of glass is defined as the ratio of the speed of light in air to its speed in glass. It is not necessary to measure the speed directly, as a reference to Fig. 1 will show.

Let us assume that we have a beam of light from a distant source, such as the sun, obliquely incident upon a glass surface XY. AM and BN represent portions of wave-fronts, and ABC and MN are rays of light at right angles to these wave-fronts. In a case such as this we say that the light source is at infinity, that the wave-fronts are plane, and that the rays are parallel.

The light rays AB and MN reach B

and N at the same instant. At this instant the ray at N enters the glass and thereafter travels in glass, while the ray at B is in air, and must continue to travel in the straight line ABC until it reaches the glass surface. In the meantime the ray at N goes from N to O, because the speed of light is less in glass than it is in air.

The ratio of the speeds in air and in glass is the same as the ratio of the lengths of the lines BC and NO. Now, the speed of light through any medium is something which nature has predetermined and has firmly established for that substance; hence the ratio of the speeds of light in two unlike media is invariably the same—a constant quantity, n , to which the name "Refractive Index" or "Index of Refraction" has been given.

When the refractive index is known, we can then tell what curves to put on the glass to produce a lens that will fulfill any given requirements.

Means for Measuring Index

The refractive index is determined by measuring the angles of incidence and of refraction with the spectrometer or the refractometer. The term "refractometer" in this connection has nothing to do with "refracting" the eye. It is used to mean "refractive index measurer."

When the refractive index is to be measured by means of the spectrometer, a small wedge of the glass must be prepared with two polished surfaces, one of which is silvered. The measuring is done by what is known as "autocollimation," perhaps the most accurate method known.

For measuring the refractive index with the refractometer, the glass sample is prepared with two polished surfaces at right angles to each other, neither one of which is silvered. The sample is placed on a dense glass prism, which is a part of the refractometer, and the refractive index is measured by "critical angle," with the light at "grazing incidence."

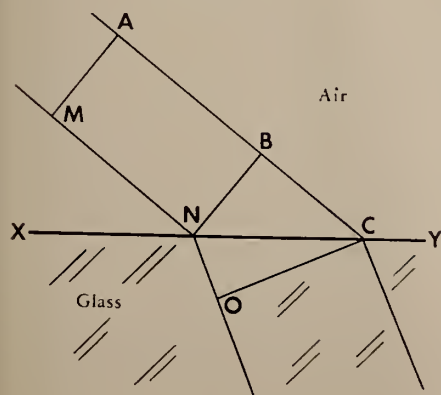
The measuring of refractive index is an important part of the work of producing a lens or an instrument. Every pot of glass made in the B&L factory is measured, and the job must be done accurately. This work is under the direct charge of the Scientific Bureau.

New Kodak Film Divisions, Managers

Managers of two new divisions of Eastman Kodak motion picture film department is announced by Donald E. Hyndman, manager of the department. Effective July 1, Gordon A. Chambers is named manager of the new Southern division and Kenneth M. Mason manager of the new Midwest division. Chambers will handle the Southern division from Rochester, N. Y., he said, while Mason will headquarter in Chicago beginning about the first of the year.

Emery Huse continues as manager of the West Coast division and E. M. Stifle as manager of the East Coast division.

FIGURE 1

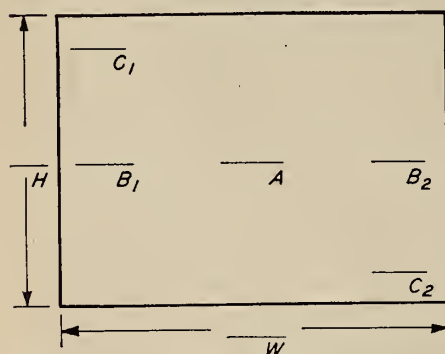


SMPTE Screen Brightness Survey

THE wide variance in screen brightness levels in motion picture theaters throughout the country has spurred the Society of Motion Picture & Television Engineers to throw into action its Screen Brightness Committee which did such a fine exploratory job on this problem in the early part of 1948. At that time the Committee was hampered by the lack of a suitable meter for the measurement of screen illumination and screen brightness—a distinction of terminology which alert projectionists should keep in mind.

This deficiency in suitable measuring instruments has now been largely overcome through the cooperation of General Electric Co., which has generously made available to the Committee a specially designed meter which should meet

FIG. 1. DATA SHEET FOR DETERMINING SCREEN ILLUMINATION BY THE 5-POINT METHOD



Read intensity on the screen in foot-candles at the five positions indicated. C_1 and C_2 are located $1/20$ of H from the edges and $1/20$ of W from the sides. B_1 and B_2 are on the horizontal center and $1/20$ of W from the sides. A is in the exact center.

SCREEN AREA

$$\text{AREA IN SQUARE FEET} = H \times W = \quad (1)$$

SCREEN LIGHT INTENSITY AND DISTRIBUTION

$$\text{RATIO } \frac{B_1 + B_2}{2} \times \frac{1}{A} =$$

$$\text{RATIO } \frac{C_1 + C_2}{2} \times \frac{1}{A} =$$

SCREEN LUMEN CALCULATION

$$A \times 2 =$$

$$B_1 + B_2 =$$

$$C_1 + C_2 =$$

$$\frac{\quad}{2} =$$

$$\text{TOTAL} =$$

$$\text{WEIGHTED AVG.} = \frac{\text{TOTAL}}{5} =$$

$$\text{SCREEN LUMENS} = (1) \times (2) = \quad (2)$$

all requirements for a genuinely scientific approach to this vexing problem.

Within a few weeks members of the Screen Brightness Committee will visit a representative number of theaters throughout America for the purpose of gathering data which, when correlated, should serve as a firm basis for estimating current field practice in terms of acceptable screen brightness. IP solicits the utmost cooperation of projectionists to the end that this survey shall be productive of results which will aid the motion picture industry over-all, let alone the projection field. (See "In the Spotlight" department on page 16 of this issue.)

1948 Survey Results Discouraging

In 1948 conditions nation-wide *ala* screen brightness levels were anything but encouraging to those who regard projection as the bottleneck of all industry effort to deliver to theater screens the finest pictorial image possible. True, the number of theaters surveyed two years ago was limited, but they were of such variety as to occasion grave doubts among technicians that the exhibition field was making a sincere effort to improve the quality of the projected image and thus aid the box-office, the source of income for the entire industry.

For example: an analysis of the 1948 survey data disclosed that only 50% of the theaters had a screen brightness level approximating the recommended range of from 9 to 14 foot-lamberts. Of special significance was the fact that only 12.5% (or 1 out of every 7) projectors checked were capable of delivering the recommended screen brightness level.

Total lumens on the screen and light-intensity *distribution* over-all from center to sides of screens (the only honest evaluation of projection quality, as pointed out repeatedly by IP) varied from a minimum of 7 to a maximum of 30 foot-candles. Approximately 50% of the projectors gave from 10.5 to 16.5 foot-candles.

An analysis of the distribution of light intensity showed that two-thirds of the projectors provided from 50 to 75% as much light at the sides as at the center of the screen. Two projectors provided only *one-third* as much light at the sides as at the center—glaring examples of misadjustment of equipment.

Figures on Screen Lumens

Generally, the survey showed that the screen lumens obtained fell below the expected values. About 17½% of the projectors obtained all the light to be expected from their equipment. On the other end of the scale, 7.5% (woefully low) were obtaining only from 35 to 45% of the light estimated to be obtainable. About 50% of the cases surveyed resulted in a range of from 35 to 75%, which figures, while by no means representing

PROJECTION DATA:

1. Projection Angle
2. Arc Lamp Type
3. Positive Carbon
4. Negative Carbon
5. Arc Amperes
6. Arc Volts
7. Projection Lens
 - (a) f/ Number
 - (b) Focal Length
 - (c) Surface Coated Yes — No
8. Type of Shutter
 - (a) Degree Opening
9. Draft Glass Type
10. Heat Filter Type
11. Projection Port Gloss. Yes — No
12. Type of Power Supply
 - (a) Rating in Amperes
 - (b) Rating in Volts
 - (c) Operating Voltage

AUDITORIUM DATA:

1. Seating Capacity

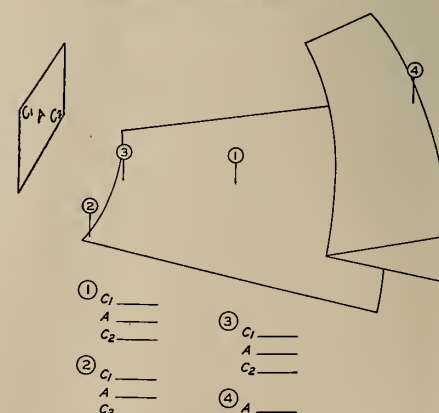
good performance, represented all the light obtainable from the equipment.

The over-all results of the 1948 survey clearly indicated the pressing necessity for an extended survey of a greater number and more varied types of theaters as a requisite preliminary to an all-out effort to raise the general level of screen brightness. This project will now be undertaken by the Screen Brightness Committee.

The results obtained in the 1948 survey were representative of theaters having screens in the range from 12 to 31 feet wide, with seating capacities from 300 to 6200 seats, and with projection "throws" from 65 to 207 feet at angles from 5 to 24 degrees.

It is not known at present whether
(Continued on page 23)

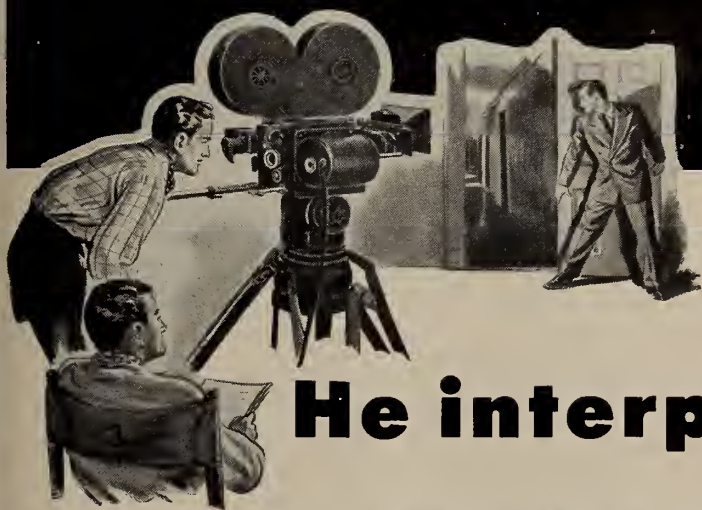
FIG. 2. SHOWING LOCATION OF AUDITORIUM SEATING POSITIONS FOR BRIGHTNESS MEASUREMENT



POSITIONS:

- (1) Center, 3½ screen widths back from the screen
- (2) Left front corner seat
- (3) First row center
- (4) Balcony top row center

Read brightness at 3 places on the screen from auditorium positions 1, 2 and 3, but only the center from position 4.



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A. General Aspects

THE enormous sums spent for the production of motion pictures with the object of increasing the quality of pictures and of realizing optical effects of real artistic value form a deplorable contrast to the neglect with which projection, *viz.*, the representation of such works of art to the public in motion picture houses, is treated.

Above all, poor illumination of the projected picture is frequently encountered, where the intensity of illuminating light decreases considerably from the centre of the picture towards its margins, and the screen shows color degradation varying across the picture area and variation in time of the color of the projecting light.

Modern technics of illumination offer all the possibilities of producing a clear and stable picture of unvarying brightness and warrant representation of motion pictures commensurate with the artistic aspirations of their producers.

Such possibilities may be realized without burdening the exhibitor with excessive additional costs, for the current expenditures for picture projection represent only a negligible part of the operation costs of a motion picture theater.

When color film of high fidelity shall be accessible to the public, screen illumination must be of commensurate quality. Poor illumination, for example, and the ensuing faulty simultaneous contrast will deteriorate the colors at the centre or at the sides of the screen. Relative decrease of the brilliancy of yellow or orange hues from the centre towards the sides will make them appear brown, and green, if reproduced with reduced intensity with respect to the other color components, will appear olive.

The artistic impression offered by a first-class color film may be dangerously impaired by lack of uniformity in brightness and color of the screen illumination.

This will be felt so much more as the quality of color reproduction systems advances.

Requisites for Quality Projection

What measures must now be taken to realize a system accomplishing high-quality projection? This question is most easily answered by setting up the requirements for screen illumination with respect to

1. Brightness, *i.e.*, necessary screen lumens;
2. Distribution of brightness across the screen, *i.e.*, ratio of brightness centre-to-sides and centre-to-corners;
3. Color degradation along the margins with respect to the centre; and
4. Constancy in time of the preceding items.

An analysis revealing the pertinent relationships and the contribution of the different parts of the projection system to the quality of illumination, is most easily carried out by following in reverse direction the path of projecting light, starting from the screen where the requirements are known and proceeding in consecutive order to projection lens, the film itself, the illumination system and, finally, to the light source constituted by the positive crater of a high-intensity arc lamp.

B. The Projection Lens

The projection lens which is located between the screen and the film has the object of directing substantially and without loss all light traversing the film towards the projection screen. Losses may be caused by:

1. Vignetting, *i.e.*, by cutting off the illumination light beams appertaining to the corners of the picture by the diaphragms of the projection lens;
2. Reflection by the numerous glass-air surfaces of the different lenses of the projection lens, and

3. Absorption encountered within the glass of the lenses.

Only such lenses are suitable for quality projection as are free of vignetting effects and the glass-air surfaces of which are given low-reflection coatings. Evaluation of the quality of a lens would be facilitated if producers would indicate for each lens the light transmission rate valid for a light beam imaging the centre of the film frame and the vignetting losses at the corners.

It is hardly understandable that projection lenses causing losses up to 30% of the transmitted light are still in widespread commercial use at a time where modern lenses may be found in the market having a transmission rate of as high as 95%.

C. Film Characteristics

The characteristics of the film itself are of preeminent importance for a projection system which is to operate with high efficiency:

1. The transparency of the brightest parts of the film picture should be as high as possible so that the brightness of the highlights of the projected picture approaches to a reasonable extent the brightness of the screen attainable without film. Color films, for processing reasons, are frequently printed with such low transparencies that they seem practically black if directly viewed.
2. The thermal load of the film is limited and the density of radiation passing through the aperture should not exceed 1 watt per mm². The problem is thus to stay below this limit of radiation density and still transmit a maximum of lumens *i.e.*,—of visible light—through the film. This may be achieved by:

a. Spectral limitation of the light employed for projection by inserting interference filters immediately behind the lamp, whereby the illuminating light traversing the film can be restricted to the frequency range of utilizable, *i.e.*, visible, light.

b. High uniformity of illumination across the aperture in order to pass a maximum of projection light through the film without excessive local thermal overload. Peaks of the distribution of illumination intensity at the centre of the film will pass the limit of thermal load at that particular point, so that the number

of lumens cannot be obtained that might be transmitted providing more even distribution.

c. The angle of divergence of the illuminating light cones pertaining to the different points on the film aperture should be limited to an angle determined by the opening of the diaphragm of the projection lens and the respective point (Fig. 1). This means elimination of surplus divergence of the illuminating light beam that would be cut off by the diaphragm of the lens, consequently the flux of energy traversing the film is limited to that part which may substantially be utilized.

3. The theoretical maximum of screen lumens through the gate can easily be calculated for a source with an even distribution of energy through the visible spectrum. The high-intensity arc meets these conditions.

If all invisible radiation could be cut in an ideal way by suitable filters, it would be possible to pass 64,000 lumens through the gate with 320 mm² without overshooting the maximum admissible load of the film fixed at 1 watt per mm².

Due to the light losses of the projection lens, the corresponding screen lumens will be somewhat less. This figure relates to an even distribution of illumination through the whole film aperture. "Standard" illumination would reduce that value to 54,000 lumens. A poor distribution results in a further decrease of these "gate lumens".

The setup of such theoretical figures is always useful for guiding the further development and for judging the efficiency of a practical system.

D. Illumination System Requirements

The construction of the illumination system of a projection lamp is of decisive importance for a satisfactory illumination of the screen and a high efficiency of the lamp.

The light flux L_c emanating from the positive crater may be calculated in a very simple way from the diameter D_c and the average brilliancy \bar{b} of the crater:

$$L_c = D_c^2 \cdot \frac{\pi}{4} \cdot \bar{b} \cdot \pi$$

The light flux passing through the aperture L_a is obtained as the product of the area A of the picture measured in mm², the average brilliancy \bar{b} of the positive crater measured in C/mm² multiplied by the reflection coefficient R of the reflector, the speed of the projection lens in terms of the covered solid angle S , the coefficient of illumination η_i —i.e., the ratio average screen brightness-to-peak brightness at the centre, and a shading coefficient η_s determining shading by parts of the positive head located in front of the reflector.

$$L_a = A \cdot \bar{b} \cdot R \cdot S \cdot \eta_i \cdot \eta_s$$

The quotient

$$\eta_{is} = \frac{L_a}{L_c}$$

may be considered to represent the efficiency of the illumination system and is of greatest importance for evaluating the quality of a lamp (Ventarc Lamps: $\eta_{is} = 0.50$).

If the screen is illuminated with even and homogeneous intensity from the centre right into the corners, the contrast of the black frame surrounding the screen will produce the impression as if the screen were brighter at the boundaries than at the centre. The screen will consequently appear similar to a bowl slightly curved and hollow at the centre.

Ventarc Reflector Light Utilization

If the ratio of sides-to-centre of the illumination intensity is reduced to 80%, and the ratio corners-to-centre to 67%, the impression of a plane uniformly illuminated screen is obtained. This distribution of intensity will be called hereinafter "standard illumination."

Full utilization of the light flux emanating from the positive crater requires a

reflector with high speed and capable of concentrating the entire light flux upon the aperture of the projector. Beyond the aperture the intensity of illumination should decrease as quickly as possible. This may be achieved only by the projection of approximately punctiform images of the points of the edge of the picture aperture circle upon the crater edge.

The new reflector of Ventarc lamps meets this requirement, as the reflecting surface was given a special curvature providing, instead of the conventional two focal points, two focal circles at two focal planes oriented at right angles to the optical axis of the reflector. These focal circles are given such a size and mutual distance that one of them coincides with the edge of the positive crater and the other with the circle containing the aperture. This is illustrated by Fig. 2.

Employing a crater surface of circular shape and constant brilliancy, a distribution curve of light intensity across the aperture of the projector is obtained with the aid of this reflector as represented in Fig. 3. It must be pointed out that this ideal distribution of light is obtained at the second focal plane of the reflector.

The parameter α represents the ratio of diameter of the crater D_c multiplied by the axial magnification M_a of the reflector to diameter of the aperture circle. Consequently α represents a criterion for the overlapping of the illuminating light spot over the circle containing the aperture.

If a "blown" arc be employed, the diameter of the aperture circle is generally given such a size that the required 80% distribution of screen illumination, i.e., "standard illumination," is obtained.

It must be stated that the new reflector illuminates every point on the film frame in such a manner that the central rays of all light cones intersect at the centre of the diaphragm of the projection lens,

FIGURE 1

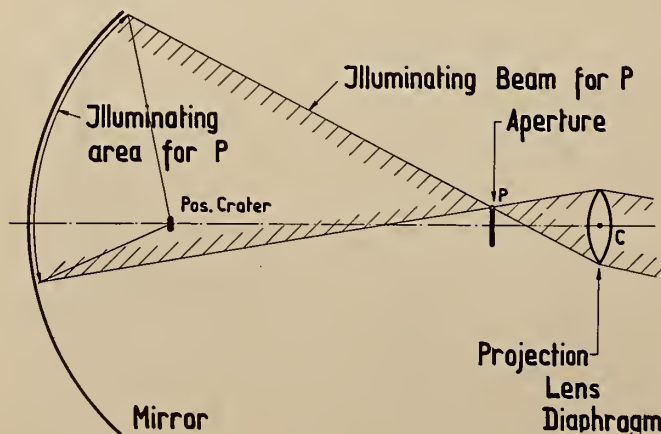
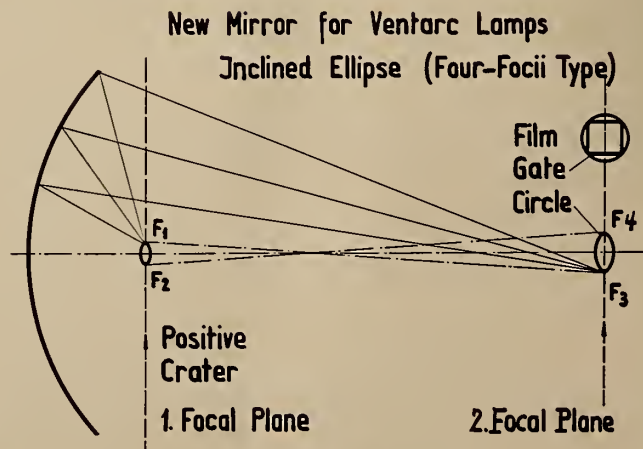


FIGURE 2



SMOOTH SWEET...



Quiet . . . dependable . . . cool as a cucumber . . .
and not expensive. A pretty picture! What more could you ask?
Why not go steady with Motiograph: It'll last for years.
Make a date through a Motiograph dealer or write Motiograph, Inc.,
4431 W. Lake St., Chicago 24, for literature on the
Motiograph projector.

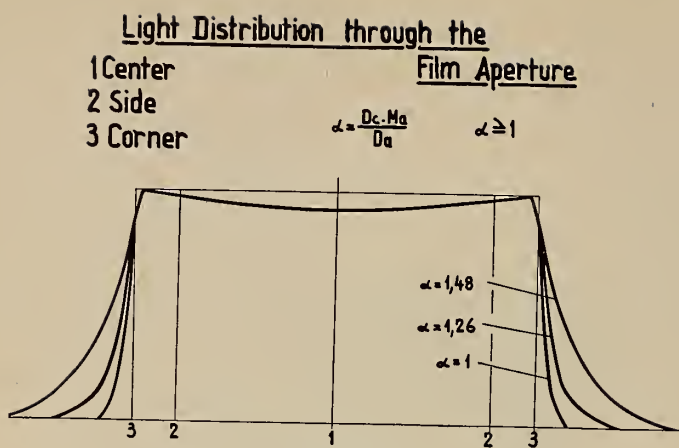


FIGURE 3

thus complying with a requirement of great importance in projection technics:

E. The Light Source

An ideal projection light source should provide constant brilliancy and color of light across its entire light emitting surface. The arc—viz., the positive crater of the normal high-intensity arc lamp—deviates considerably from this ideal. The brilliancy decreases steeply from a peak at the centre towards the crater edge, and additionally shows a considerable variation in color. The “blown” arc of Ventarc lamps offers considerable advantages in this respect, as now will be explained.

The average of brilliancy taken across the optically utilized surface of the crater of the light source is the relevant factor for obtaining a sufficient number of screen lumens if “standard illumination” of the screen is to be achieved.

Such information generally is missing in publications. Habitually, “sales figures” are given corresponding to the peak value of brilliancy at the brightest spot of the crater, which is furthermore measured in the direction of the carbon axis. Such figures, however, are useless for correct computation of the light output of an illumination system and may give rise to considerable errors.

For example, a high-intensity arc of conventional design with water-cooled contacts shows a peak value of brilliancy of 2000 C/mm² in the direction of the positive carbon axis, with an arc current of 300 amperes and an arc voltage of 80 volts.

The average brilliancy, however, taken across the entire surface of the positive crater amounts to only 1060 C/mm².

Ventarc lamps operating with high current densities provide an average value amounting to more than 80% of the peak value, which may rise as far as 90% for extremely high brilliances.

‘Blown’ vs. Conventional Arc

The light source of a high-intensity arc is substantially constituted by the intense-

ly light-emitting anodic vapors. The luminosity of any volume element of the arc stream depends upon the vapor density, on the one hand, and the current density on the other in that respective volume element.

In the “blown” arc of a Ventarc lamp the anode flame is concentrated into the cylindrical space in front of the positive crater by an air blast concentrically surrounding the arc and blowing in direction towards the negative electrode (Fig. 4). Providing coaxial alignment of positive and negative electrode, the electric current and the current of anodic vapors are both confined to the same cylindrical space of discharge, thus producing maximum light output.

In contrast to this, the anodic vapors in customary high-intensity arc lamps issue sideways from the path of the electric discharge and consequently do not contribute any more to the process of light production.

The symmetry of brilliancy distribution may be furthermore increased by the employment of a magnet coil mounted on the positive head and coaxially arranged with respect to the positive carbon.

This coil produces a magnetic field inside the arc which diverges in direction from the positive carbon towards the negative carbon and sets the arc into fast rotation around its own axis.

‘Blown’ Arc Brilliancy Distribution

The distribution of brilliancy inside a “blown” arc is rotationally symmetrical in contrast to a customary high-intensity arc where the distribution of brilliancy across the crater varies as the point of observation moves along a circular zone of the reflector surface.

Figure 5 represents the distribution of brilliancy across the crater of a “blown” arc as it is seen from a point of the reflector surface elevated by an angle of 50° with respect to the axis of the positive carbon. The average value of the brilliancy amounts to more than 80% of the peak value, and this peak value is seen from any point of the reflector sur-

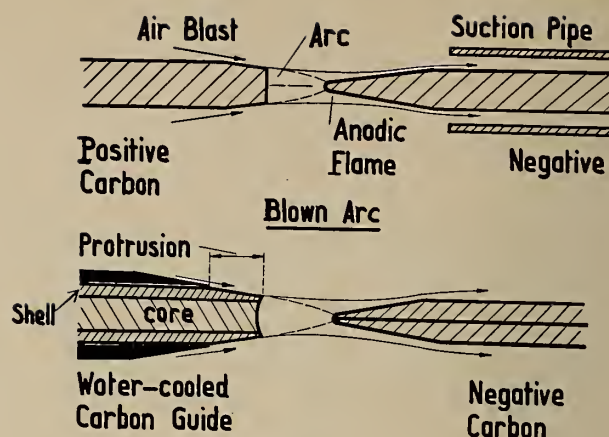


FIGURE 4

face by a light ray piercing the axis of the positive carbon.

It must be mentioned that the average brilliancy measured at an angle of 50° to the carbon axis constitutes a better point of departure for the calculation of the light output of a projection system than a corresponding value measured in the direction of the carbon axis, as the exterior zone of the reflector receives the major part of radiant energy emanating from the arc.

The distribution of brilliancy inside a “blown” arc is very constant in time. This, in combination with the aforementioned new reflector of the Ventarc lamp, permits the realization of “standard illumination” of the projection screen with extremely high efficiency as regards distribution of intensity as well as color uniformity.

If the current exceeds 70 amperes, it is necessary in customary high-intensity arcs to employ an angular trim of the carbons inasmuch as coaxial alignment of the carbons will render the arc unstable. This implies continuous rotation of the carbon which represents undesirable complication of the lamp mechanism. An angular trim of the carbons, furthermore, comports considerable increase of the arc voltage and a corresponding reduction of efficiency.

Ventarc Air Blast Hookup

The air blast of the Ventarc lamps automatically stabilizes the arc so that coaxial alignment of the carbons may be employed up to the highest current densities.

The steady effect of the air blast co-operating with the substantially positive resistance coefficient of the concentrated arc, permits current supply to the lamp from a current source the open-circuit voltage of which must exceed the arc voltage only by a few volts.

Due to the symmetrical position of the air blast with respect to the arcing end of the positive carbon, the plane of the crater edge will always be disposed at right angles to the axis of the carbon,

thus rotation of the carbon may be dispensed of.

This is a further advantage of the "blown" arc, as it eliminates periodical fluctuations of the arc discharge caused by irregular consumption of the positive carbon during rotation of the carbon.

F. Ventarc Feed Control

It is an important factor for the quality of positive feed control that the edge of the positive carbon be continually vertical; it even represents an *indispensable* condition for satisfactory and precise operation. The requirement to keep the positive crater exactly in its position is so much more strict as the quality of the optical illumination systems increases.

A lamp mechanism which admits forward or backward deviation of the positive crater from its ideal position by several millimeters and which must consequently operate with a considerably enlarged light spot on the aperture plate, does not constitute an acceptable technical solution.

All feed control systems which have the object of locating the crater into the focus of the reflector employ the principle of projecting an image of the arcing end of the positive carbon upon a radiation-sensitive element. This element influences the feed mechanism in such a way that the crater is always kept at the focus.

Such a device will operate at its best if the position of the crater edge itself can be employed as a criterion for the control system, which implies that the contrast in density of radiation between the shell of the carbon and the anode flame as viewed sideways from the arc must be made as high as possible.

Ventarc Density of Radiation

This is achieved by Ventarc lamps where the concentrated anode flame viewed sideways provides a four- to five-fold density of radiation with respect to the outer crater edge of the positive car-

Red-to-Green Ratio of the Screen Illumination for the Ventarc 50 Amps.

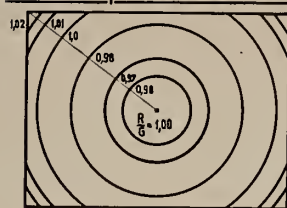


FIGURE 7

bon. A simple and inexpensive photocell governing the mechanical drive of the positive feed by means of a glow discharge lamp and without any electrical contact thus provides feed control of extremely high precision, keeping the crater edge at the focus of the reflector with an accuracy of ± 0.1 mm. This warrants extremely good constancy in time of the illuminating light. Fig. 6 represents a schematic sketch of such a feed control system.

Long endurance tests concerning the electrical elements extending over more than 10,000 hours proved the unsurpassed reliability of this control system. It may be added that no subsequent adjustment was necessary during such tests.

The negative feed control serves to keep the arc current constant by regulating the length of the arc gap. Precision amounts to $\pm 2\%$ and thus meets with all requirements as regards constancy of illuminating light.

The combined effect of the new positive and negative feed control system keeps fluctuations of light within limits of a few percentage points over an entire period of projection, which is considerably below the limit of perception.

Color Illumination Uniformity

It must be emphasized that the Ventarc lamp at the same time provides satisfactory color uniformity of screen illumination. Measurements of the decisive red-to-green ratio of the light across the screen illuminated by a 50-ampere lamp

are shown in Fig. 7. The limit of perception of decoloration at the screen corners in comparison with the centre will in practice be found at a deviation from unity of the red-to-green ratio of from 8 to 10%.

Color uniformity of the screen illumination is of highest importance for satisfactory projection. Standard should be set up and simple methods of measurements should be developed for this effect.

G. "Blown" Arc with High Current Densities; Negative Electrode Problem

Operation of the "blown" arc with high current densities and short gaps will give rise to the formation of deposits from evaporation products of the positive core on the tip of the negative electrode. Formation of "mushrooms" may ensue which will render the arc unfit for practical use. This effect may be eliminated by sufficiently enlarging the arc gap so that a sufficient amount of oxygen can penetrate into the discharge column and prevent the formation of cerium carbides on the tip of the negative electrode.

Employing the relatively high voltages admitted in normal high-intensity Beck lamps with angular trim, the arc gap can be enlarged to such an extent that a "blown" arc will operate with a negative rod electrode without difficulties up to arc currents of 130 amperes. This limit may be extended even further by the employment of negative carbons with a specially effective anti-carbide core.

The enlarging of the arc gap and the corresponding increase of the arc voltage, however, means dissipation of energy and causes increased heating of the lamp-house. To avoid this, a ring-shaped cathode is employed in the Ventarc lamps of highest light output (more than 30,000 lumens) where the arc is struck between the positive crater and the inner edge of

(Continued on page 24)

FIGURE 5

'Blown' Arc: Distribution of Brilliance b

$\alpha = 50^\circ$

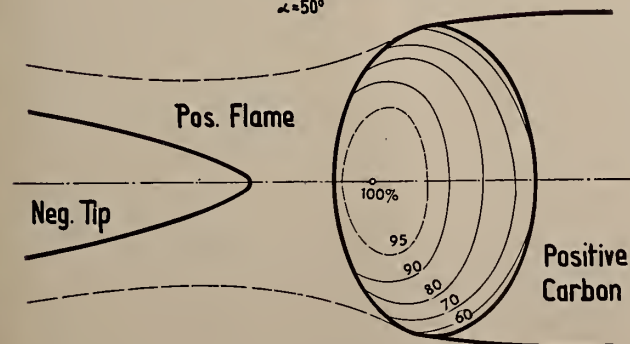
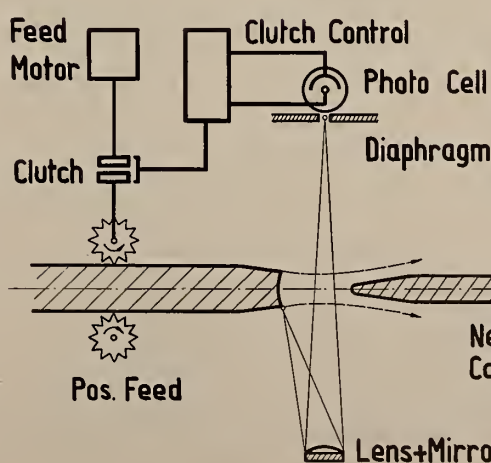


FIGURE 6



From a Manufacturer's Casebook

ELECTRICAL resistance plays so important a part in the daily work of the projectionist that a thoroughly practical understanding of Ohm's Law is a fundamental requisite for his work. The algebraic forms:

$$I = \frac{E}{R}, \quad E = IR \text{ and } R = \frac{E}{I}$$

are probably quite familiar to everyone. We can substitute values at hand for any two of the three quantities considered and find the third; but does this imply that the real meaning and application are clear, and that when confronted by a problem involving current volts and ohms the Law can be readily employed in its solution?

It has now been 35 years since the appearance of the Hertner Transverter, but we still receive letters from projectionists which show plainly that they have missed the point of just what it all means.

Prime Considerations

In any carbon arc, no matter of what kind, the main considerations are amount of current, voltage across the arc, and length of arc. These are all interdependent, yet if two of the three are fixed, it does not mean that the third will always assume a definite value. This is true largely because, while we have done nothing to change the apparent length, the flow of the arc may have assumed a new path with a different resistance.

This apparent discrepancy seems to bedevil the Suprex arc more than some of the other types. Horizontal operation, together with the very special construction and materials of the carbons, probably explain this. Lengthening the arc increases the voltage across the arc or decreases the amperes, or does a little of each—usually, but not necessarily.

Quite often when operating an arc on a ballast of fixed resistance and with a supplied voltage so steady that there was no discernable variation, the current is

II. The second of a series of articles anent fundamental technical data as culled direct from the files of manufacturers of projection equipment. This contribution by the Engineering Staff of The Hertner Electric Co., manufacturer of the Transverter, is concerned with the application of Ohm's Law to some common motion picture projection room problems.

found to vary, sometimes abruptly and sometimes periodically, especially if the current strength is not suited to the size of carbon used. It is this condition that is mystifying and leads to a suspicion as to the infallibility of Ohm's Law.

The Suprex arc today is operated either off a generating source of constant voltage with a ballast resistance, or off a source having what is known as a drooping characteristic, that is, as the demand for current increases the voltage produced by the generating device decreases. With the drooping characteristic it is possible to operate without the use of ballast, but two arcs cannot be burned simultaneously from the same generating source.

With the other plan, using a constant voltage source, this voltage is held somewhat higher than that required for the arc, the difference being consumed in the ballast. In this manner, two or more appliances can be used at one time, and the arc in each will burn independent of all the others. The Suprex arc is particularly adapted to this sort of operation because the ballast resistance required is small, being on the order of 6 to 10 volts, in place of the 25 to 30 usually employed with the higher voltage arcs.

Supposing, then, an arc is burning on a constant voltage source with a ballast in series. The voltmeter, if steady, will show that the generator output is constant. If the voltage should change, the voltmeter would tell how much, just when, and for how long.

The ballast, adjusted with a certain position of the handle or with a certain combination of short-circuiting clips, has a very definite resistance, which means that with a given current in amperes the voltage across the ballast can be only one definite thing. The one thing that cannot be controlled is the resistance of the arc itself.

Unwarranted Criticism

All of which leads us to an important conclusion:

If the voltage remains constant as shown by the meter across the generating source while the current is fluctuating, the current source cannot be blamed for these fluctuations.

Suspicion will next fall on the ballast. Herein is always present a possibility of poor or loose connections, which are really the only cause of rheostat trouble. To detect such trouble is not so easy, since the voltmeter across the rheostat or ballast will keep step with the fluctuations of amperes in the arc because our old friend Ohm's Law is in full force and

$$R = \frac{E}{I}$$

If the resistance remains constant, as it should, and the current changes, the voltage drop across the ballast will change up or down in proportion to the current change.

One way of detecting rheostat trouble is to look for hot spots. We have found rheostat installations in which the series ribbon type is used, and where the resistance value is adjusted by the cutting out or in of clips on the front, where the clips had not been tightened and were so hot as to burn the hand.

Another way of checking ballast is to put a voltmeter across its terminals and watch it in conjunction with an ammeter. If at any time a fluctuation of the voltmeter can be detected when the ammeter is steady, the trouble is definitely located in the ballast.

Types of Ballast Resistances

Ballast resistances, of both the series and the multiple type, are so constructed today that very fine gradations of current values are possible and usually no adjustment of the field regulator is re-

FIGURE 1. Multiple progressive.

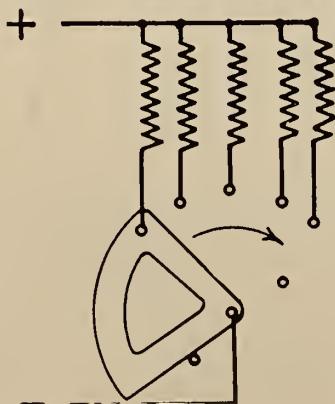
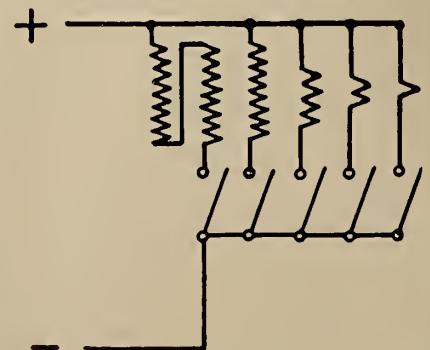


FIGURE 2. Multiple selective.



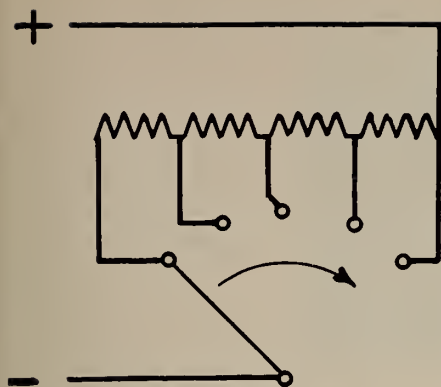


FIGURE 3. Series progressive.

quired. These finer gradations are accomplished in both the series and the multiple types by using sections of various resistance values and then arranging that these are inserted *selectively* rather than *progressively*.

To dig into this topic a little deeper: the multiple type of resistance generally consists of wire coils, cast grids or, in some cases, ribbon, the one end of each being attached to one rheostat lead, while the other ends are brought to either a series of contacts which are swept by an arm (Fig. 1) or to independent switches (Fig. 2), the arm or switch being then connected with the lead of the rheostat.

If the arm be used, the sections of resistance can be cut out or in *progressively only*. There is no choice. If the independent switches be used, the sections can be cut in or out *selectively*, any one being operable at will without disturbing the others.

Similarly with the series type of resistance where all the sections carry the whole current, an arm (Fig. 3) can be arranged to cut the sections in or out progressively, or clips (Fig. 4) can be used to "short out" any section selectively.

As an illustration, suppose there are five sections of these which have values of 1, 2, 4, 8, and 16 ohms and all have the same current capacity, the total resistance series-type being 31 ohms. No 1 may be shorted (Fig. 4) leaving the resistance 30; No. 2 may be shorted, leaving a balance of 27; Nos. 1 and 2 give 28; No. 4 gives 27; Nos. 1 and 4 give 26; Nos. 2 and 4 give 25, and so on in 1-ohm steps down to a final value of 1 ohm.

However, if all of these steps were made of the same value, approximately 6 ohms each, we would be able to get only 30—, 24—, 18—, 12—, and 6-ohm steps.

Elements of Confusion

In the multiple type the same plan brings the same results (Fig. 2). A shift in the position of the field regulator should no longer be necessary, except possibly in going from an average to a very dense film. The temporary adjust-

ment is possibly more easily accomplished in this way.

There are always a number of unlooked for possibilities that tend to confuse one and sometimes put unmerited blame on a unit of equipment. It is not unusual to have a steady generator voltage but an unsteady arc due to imperfect contacts in the ballast rheostat or in the wiring.

A recent case of this kind was blamed first on the generator, then on the rheostat, but the trouble was finally found in the wiring. The actual fault was hidden in the conduit imbedded in concrete where it could not readily be discovered, and it was located only after all combinations of lamps, wiring and ballast had been tested. The fault always accompanied the combination which included that particular part of the wiring which proved defective. This wiring had to be pulled and repaired.

Frequently it is found that the clips on the series-type ballast now widely used were changed but not tightened. Heating and, in some cases, oxidation ensued with consequent fluctuation of the arc.

Typical Suprex Arc Case

Anent the Suprex arc, where two lamps are burned alternately, and on change-over simultaneously, off the same generator, each lamp with its ballast, complaints were made that on throwing in the second lamp the light on the first lamp would dip. Investigation showed that this statement was true. The voltmeter across the generator showed no drop with the burning of the second lamp; in fact, sometimes an actual slight rise in voltage would ensue, indicating overcompounding.

Further investigation showed that in most instances the distance from the projectors to the generator was rather long, and the wire, while in accordance with Underwriters' requirements, had enough resistance drop to account for the trouble.

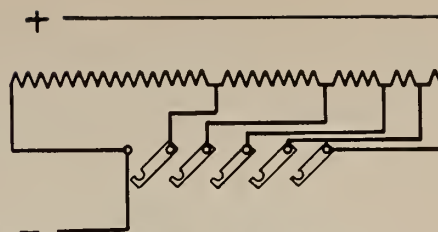


FIGURE 4. Series selective.

Probably the first thing to occur to most projectionists confronted by this condition would be to increase the size of the wire and its consequent carrying capacity so as to minimize this effect.

A much better solution was worked out. By running two independent lines to the lamps the trouble was entirely eliminated; the amount of copper used was no more than in the original installation. The line drop caused by the current in either lamp was then confined to that lamp, and this drop could then be considered a part of the rheostat drop and had no distorting effect.

National Show-Giving Service Is Offered by RCA

A professional sound motion picture presentation service is now being offered on a nation-wide basis by RCA Service Co. Under this package program, RCA assumes the responsibility for all details involved in arranging and conducting a sound motion picture presentation. An RCA service engineer will assist the client with all show arrangements; provide the screen, projector, and loudspeakers; supply a skilled projectionist; and, when requested, arrange for a public address system and telephone tie-ins.

The client has only to supply RCA with the time and location of the meetings and the film to be shown. This service is pointed at companies that use sound films for sales, training, and information meetings.

FORMER PROJECTIONIST HEADS WORLD-FAMOUS COMMUNICATIONS ORGANIZATION

It's a far cry from cranking a motion picture projector in the Swan Theater, Terre Haute, Ind., when only 14 years old, to the presidency of American Telephone & Telegraph Co., but this was the span of achievement covered by Leroy A. Wilson, shown here greeting stockholders at the recent A. T. & T. meeting. Only 48 years of age when elected head of one of the world's outstanding industries, Wilson is a typical product of the American democratic system.



IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

WE RECENTLY discussed with Dr. W. W. Lozier, chairman of the SMPTE Screen Brightness Committee, the forthcoming survey by that group of a representative number of theaters in an effort to find out just what screen lighting levels prevail throughout the country. Dr. Lozier is most anxious to obtain the wholehearted support of projectionists in the work of the Committee, and he has asked this department to broadcast an appeal for craft cooperation.

We are very happy to endorse this survey, and we hope that projectionists will cooperate fully with Committee members who visit their theaters. We are assured that the survey work will in no way interfere with the regular show, and the only non-show time required will approximate 15 minutes for checking screen light.

Dr. Lozier advises that every effort will be made to serve advance notice of at least 24 hours of a Committee member's visit to a given theater, so that the projectionist will be subject to a minimum of inconvenience and impingement upon his personal time. This survey is a most

worthy project, and we know that the craft, as always, will go all out in the interest of general industry welfare.

- E. J. McCannel, secretary of Local 510, Fargo, N. Dak., is also an active participant in civic affairs. Determined to help clean up certain unsavory conditions that had existed in his community for some time, Ed put on an intensive campaign for the office of police commissioner. Despite terrific odds, he came through victorious, and for the next four years, at least, Ed promises that the city of Fargo will have a progressive and honest police administration.

- Officials of Milwaukee Local 164 recently concluded negotiations with the independent and chain theaters in its jurisdiction. The bone of contention in these negotiations was the demand of the union that projectionists be paid for one-half hour preparatory time. The chain theaters—Fox, Warner, Standard, and Orto—agreed to this demand without too much delay, but it took a three-day strike at the independent holdout houses to make them come to terms.

Another point won by the Local offi-

cials was the installation of toilets and running water in those projection rooms not having such facilities.

The officers and executive board members of Local 164 are to be congratulated for their splendid teamwork in these negotiations, not forgetting the valuable assistance rendered by IA Representative Bill Donnelly and the General Office.

- Recognizing the importance to the craft of a thorough grounding in theater Tv, Bob Bennett and Harry Beauford, business representatives of San Bernardino Local 577 and Barstow Local 730, respectively, organized a Tv course for their members at the San Bernardino Valley College. Although the course was sponsored primarily by Local 577, it was open to the members of sister IA Locals. E. W. Harper, member of Hollywood Local 728 and a faculty member of the San Bernardino Valley College, was the instructor, with classes being held Monday through Friday from 8 a. m. to 11 a. m.

One hour each day was given over to theory and two hours were spent in practical training in building and analyzing the various circuits. Many subjects—including basic radio, audio amplifiers, and sound systems were covered—and an advance course is now being planned for next year. Proving that age is no barrier to learning, Milton E. Franklin, charter member of Local 577, was the top student in the class.

- In answer to a call for donors to its blood bank, a mobile unit of the Red Cross was stationed in the meeting hall of New York Local 306 to receive the blood donations offered by the members, many of whom answered the call. Herman Gelber, president, and Steve D'Inzillo, business representative of the Local, were in charge of arrangements.

- Jess Bollman, long-standing member of Oklahoma City L. 312, is now in the theater supply business, having launched the Century Theater Supply Co. Jess was formerly chief projectionist for the Cooper Theater interests and is familiar

FIRST TV CLASS SPONSORED BY SAN BERNARDINO LOCAL 577 COMPLETES COURSE



Seated, l. to r.: Dominick Anastasia, Bob Bennett, bus. rep., Local 577, and E. W. Harper, class instructor. Standing, l. to r.: Harvey Franklin, C. J. Kelley, Jr., Harry Beauford, bus. rep., Barstow Local 730; Chas. Wetteroth, Edward Franklin, Drew Anderson, James Duncan, James Harmon, Milton Franklin, Don Hopsker, George Dillon, and Frank Benjamin.

Scranton L. 329 Shows the Way

By D. E. BALL

IP is proud to present this account of how a moderate-size IA Local, having limited financial and other means, displayed a brand of foresight, initiative, courage and self-sacrifice in instituting an instruction course in theater Tv that points the way for many a larger and more affluent IA group.

LIKE many other IA Locals, we members of Local 329 had what might be termed a "smoldering interest" in theater Tv in that we were more or less content to sit back and await "future developments," a phrase that in the past has lulled our craft into a position of false security and might very well do so again. But last Fall this smoldering interest was ignited into flaming concern when Scranton was selected as one of the outlets for the showing *via* theater Tv of the Baseball World Series games.

Our participation on the theater end in these broadcasts gave us much food for thought in that it jolted us into the realization of how little we knew of Tv in general and of theater Tv in particular. The program formulated to correct this deficiency is outlined here in the hope that it will spur other IA Locals

to similar action as a means of self-preservation.

Local 329 does not claim that it pioneered in setting up such a program, nor does it claim that the program is the most inclusive. We simply did the best we could within our limited means—but we did *something*!

The Program Is Launched

The first step was the appointment of a special committee to explore the whole field of theater Tv. This involved the accumulation of data from Tv equipment manufacturers, engineers, executives in the Tv industry and, last but by no means least, from the IA and from IP.

Our survey convinced us that special and intensive training was essential if projectionists were to stand on their own with Tv and not require an "engineer" any time some slight misadjustment of

with every phase of the business. We wish him luck in his new endeavor.

• Once again the New York State Ass'n of Motion Picture Projectionists appointed yours truly its delegate to the New York State Federation of Labor conference, which will be held in N. Y. City the week of July 31.

• Sam Picinich, O. H. Phelps, and Louis J. Boudreaux, members of New Orleans Local 293, make up the projection crew at the Saenger Theater. These men have

worked together for over 20 years, with never any dissension between them. Sam Picinich has served the Local as treasurer for the past 30 years, and five years ago he was presented with a gold wrist watch by the membership for 25 years faithful service.

• *Out-of-Town Visitors:* Fred Evans, Local 165, Hollywood, Calif.; Gene Mathis, Local 462, Vineland, N. J.; Harold F. Sherwood, Local 813, Cape May, N. J.; and M. D. Boatright, contributor to the editorial pages of IP.

INDUSTRY ADVISERS AT UNESCO



IA President Walsh and screen star Myrna Loy are shown at the recent UNESCO (United Nations Educational Scientific and Cultural Organization) conference in Florence, Italy, which they attended as advisers to the U. S. delegation.

IA ELECTIONS

LOCAL 164, MILWAUKEE, WIS.

Glenn C. Kalkhoff, *pres.*; Walter Behr, *vice-pres.*; Oscar E. Olson, *bus. rep.*; George Brader, *treas.*; Robert Lucht, *rec. sec.*; Charles Beggs, Norman Habersat, John Black, Irvin Rotter, *exec. board*; Myrl Melton, Jack Painter, Alfred Otto, *trustees*; Kalkhoff, Olson, Lucht, *del. IA Convention*; Olson, Kalkhoff, *del. Wis. Fed. of Labor*.

LOCAL 365, WARREN-HUNTERDON, N. J.

James T. Walker, *pres.*; Roy Rothenbeck, *vice-pres.*; George F. Miller, *bus. rep.*; Harry M. Hartzell, *sec.-treas.*; Victor Bufis, *sgt.-at-arms*; Harold Lowe, Clarence Smith, Reed Van Gorder, *exec. board*; G. F. Miller, *del. IA Convention*.

LOCAL 581, BATAVIA, N. Y.

Harry R. Haus, *pres.*; Herman D. Gabriel, *sec.*; Harry O. Tabor, *treas.*; Gerald R. Henderson, *bus. rep.*

equipment occurred. To implement the program a special weekly assessment was levied on the entire Local membership, even though participation in the program was elective and not compulsory.

The program envisioned two basic methods of instruction: (1) classroom lectures, and (2) actual work on home Tv receivers. The first phase consisted of a series of 15 lectures held at the University of Scranton given by members of the faculty. Classes of two hours duration each were given two afternoons weekly in order to accommodate the various shifts. We're proud of our average attendance record of 45 men each week out of a total membership of 65.

Here is a list of the topics covered during the lecture periods:

Topics Allocated per Period

FIRST PERIOD (Basic Electronics): 1. Theory of the Atom; 2. Voltage Characteristics; 3. Current; 4. Resistance; 5. Schematics, Symbols, Block Diagrams, *etc.*; 6. The Vacuum Tube; 7. Electronic Components (parts); 8. A-C, D-C Current (graphs); 9. Power Supply; 10. Types of Circuits (amplifiers, rectifiers); 11. R. F. and Mixer Circuits; 12. IF and Audio Circuits; 13. Reproducers (speakers); 14. AM-FM Radio Circuits; 15. Oscilloscope and Wave Forms.

SECOND PERIOD (Tv Application): 1. Basic Tv Theory; 2. Scanning Process; 3. Electron Beam Formation; 4. Tv Camera Tubes; 5. Introduction to Tv Circuits; 6. The Tv Signal; 7. Studio Practices; 8. Tv Wave Propagation; 9. Basic Tv Circuits; 10. Cathode Ray Tube and Deflection Circuits; 11-12. Tv Receivers and Their Circuits; 13. Schmidt Optical System; 14. Home Tv Receivers; 15. Theater Tv Receivers.

The foregoing list may seem imposing to the uninitiated, but to Local 329 it represents only elementary work which will require a great deal more study. This work will be continued in the Fall.

The second phase of instruction included the use of home Tv receivers, the study of controls, interference and identification of minor troubles. We hope to institute a shop practice course at a later date, to embrace soldering methods, meter reading, tube testing, *etc.*

It is a well-known fact that while theater patrons will tolerate inferior sound reproduction, they will resent any apparent deviation from top quality in the visual image. They care little, if at all, about the means used to present the picture—whether *via* coaxial cable, balanced lines or over the air—but they insist upon a good screen image. Once a Tv program is "lost" and the show interrupted, there will be much more at stake than a mere refund.

It may not be necessary for the Tv projectionist to understand complicated



Typical classroom scene during the course of the theater Tv course conducted by L. 329. Whenever possible, lectures included the use of equipment under discussion. More than two-thirds of the membership attended two classes weekly over an extended period of time.

electronic theory, servicing and engineering practices, as there undoubtedly will be service engineers provided much in the same way that our present soundfilm equipment is handled. However, the projectionist *must have a knowledge of the six or seven basic components* which make up the Tv reproducer.

Our thought in Local 329 is that projectionists should be able to do their own job and not have an "engineer" standing over us all the time. Failing this, the thousands of bright boys with college degrees who are now more or

less "on the beach" in terms of job opportunities will be very happy to step in and do the job for us.

Most of the topics listed previously can be taught in the classroom; and it is likely that a great majority of IA Locals are located near some college or even high school which, having both the instructors and the equipment, would be glad to cooperate in such a program. Of course, such programs cost money and require considerable time and close application. It's just a question as to how keenly the IA projectionist feels about

his future whether he follows through on such a course.

Any Local embarking on such a program should head it up with members who not only understand something about the subjects to be taught but who also understand the capabilities of their brother members. Nor must the human characteristics of the individual member be overlooked.

The Time Is Now

We of Local 329 feel that theater Tv will be an actuality in some form or other within the next two years. We want to be ready. Even if theater Tv should never eventuate, the knowledge we have derived from this course will help us in our present jobs and in many other ways.

Times and methods change, and we projectionists must keep pace. Those who do not do so will finish out of the money. It will be much too late to learn about Tv *after* such equipment is installed in your theater. It is later than we think.

The foregoing exposition of the Local 329 theater Tv program is not intended as any drum-beating on our behalf but simply as a means of passing along what we consider to be important information to our brother craftsmen. If it serves that purpose to even a limited degree, we shall feel amply compensated.

The FS Multi-Layer Heat Deflector

By ROY BASTIEN

Fish-Schurman Corp., N. Y. City

WHEN a polished plate of clear glass, quartz or plastic has a system of thin, transparent, dielectric films deposited on one or both of its surfaces, it exhibits certain interesting properties. If the films are arranged with due regard to their number, thickness, and refractive index, certain portions of the radiation spectrum are reflected and others transmitted. These systems have negligible absorption so that the radiation not reflected is transmitted.

By this means there has been developed and produced commercially a multi-layer interference filter having the property of reflecting a substantial portion of the infra-red (heat) spectrum while transmitting nearly all of the visible radiation (as high as 95%). This filter is marketed as "Type XUR-96 Heat Deflector."

Reflection vs. Absorption

Installation of the XUR-96 normal to the optical axis of high-intensity carbon arc projectors, of either the condenser or reflector type, results in great reduction of heat with very little loss of visible light. Elimination of heat on the film gate with consequent absence of film buckling and embossing is thereby provided.

The XUR-96 Heat Deflector has been adopted as standard equipment by leading reflector-arc manufacturers and is used by motion picture studios in Hollywood for background projection.

Wherever heat reduction is desirable the XUR-96 provides an unusually adequate solution, since heat is reduced by *reflection* rather than by *absorption*. It is well known that heat absorbers attain such high temperatures that breakage follows.

Simple Mounting of Unit

At present the XUR-96 deflector is made in discs of $4\frac{1}{4}$ -, 5- and 6-inch diameters on heat-resisting glass or quartz. The coating may also be applied to the plano surfaces of condensers. The $4\frac{1}{4}$ -inch size fits the air deflector mount of the most popular projectors. Arc lamp

manufacturers will furnish the necessary hardware for installing the XUR-96 in equipment made prior to its development.

The multi-layer coating is quite rugged and may be handled with the same care as any other coated optical system. It may be cleaned with the usual solvents with a grit-free cloth, cotton or soft lens tissue.

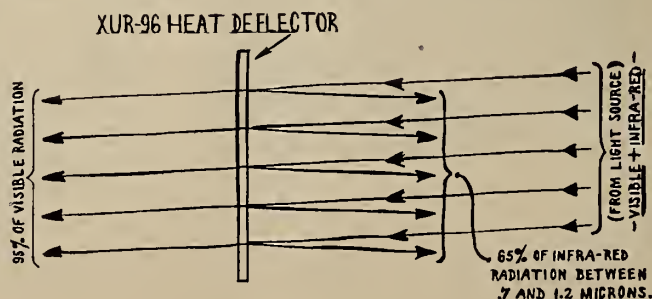
Drive-Ins Overwhelm New House List

Total of 580 new theaters, including 420 drive-ins and 160 indoor houses, were opened in the first six months of the year. Either regular or auto theaters were opened in all but three of the 48 states, with drive-ins opened in all but five, and indoor theaters opened in all but 10 states.

Texas, with 69 new situations—22 indoor and 47 drive-ins—added the most theaters to its list in the half year. Pennsylvania, with 35, six theaters and 29 drive-ins, was second, and California was third, with 31 new spots, including eight indoor houses and 23 car sites.

FIGURE 1

Showing the setup and function of the XUR-96 disc and the manner in which it deflects the unwanted heat-producing light rays.



SMPTe SCREEN BRIGHTNESS

(Continued from page 10)

the Committee intends to check any drive-in theaters, and it is doubtful whether such an effort would be productive of data which is not now common knowledge to the entire projection field. Illustrative of screen brightness levels existing in drive-in theaters is illustrated by the recent incident wherein a check of the light level at a Miami drive-in had to be abandoned because the incident light on the screen failed to occasion the slightest movement of the meter needle.

Various data relating to procedure and to the basic questions to which answers will be sought accompany this article. Screens will be checked by the 5-point method, which involves the measurement of light intensity at the upper left- and lower right-hand corners, and at the right and left edges midway between the top and bottom of the screen, and at the center.

Plans for the survey are such that much of the desired information can be obtained from the projection room without interruption or interference to the regular show. Approximately 15 minutes will be required to take measurements at the screen of incident and reflected projection light; these will require projection of light on the screen successively from each lamp and projector without film, and these are the only data which it will be necessary to obtain before or after the show.

A copy of the data obtained will be provided to each theater surveyed but otherwise the identities of the theaters will be known only to Committee personnel, and any published reports or summaries of data obtained will not contain the identities of the theaters involved.

Obviously, any worth while determination of screen light levels is not an enterprise which may be engaged in by tyros in the art of motion picture projection. So many diverse factors must be considered, and any one of which may exert a vital influence on the final result, that the utmost cooperation between the survey teams and projectionists is prerequisite to a satisfactory outcome.

That projectionists will extend a full measure of cooperation in this work as a contribution to general industry welfare is the hope and the belief of IP.

But One Always Has to Eat!

Plans of the Stuyvesant Realty Co. to build a theater in Union, N. J., have been abandoned because of "changed conditions," said to be principally the advent of television, and the company proposes to build instead a \$50,000 super market.



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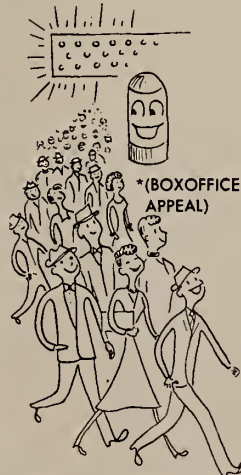
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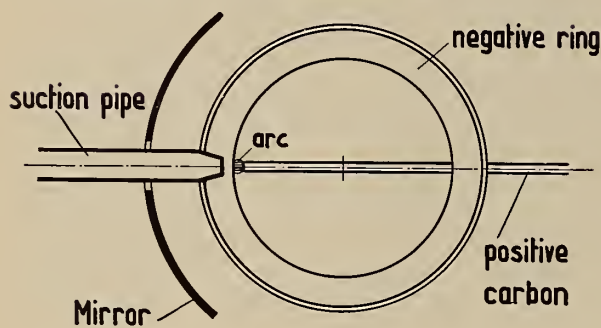


FIGURE 8

the ring. Slow rotation of the cathode ring continually removes the evaporation deposits on the ring edge from the arc plasma and brings them into contact with the fresh air where they may be oxydized.

Ring Cathode Arrangement

Figure 8 shows an arrangement with ring cathode. The ring consists of electro-graphite and is made so flat that addi-

tional shading caused by such parts of the ring located within the projection light path amounts to only a few percent of the utilizable light flux.

In Ventarc lamps with ring cathode the optical illumination system is designed according to Fig. 9. A plane deflection mirror is employed to produce a 90° deflection of the illumination light beam. The cathode ring, the plane of

Optical System for Ventarc with ringcathode

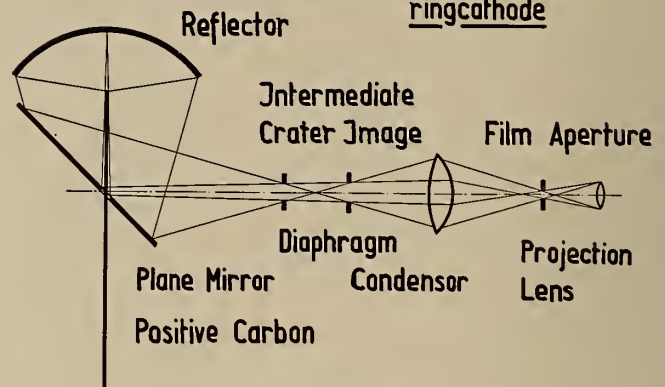


FIGURE 9

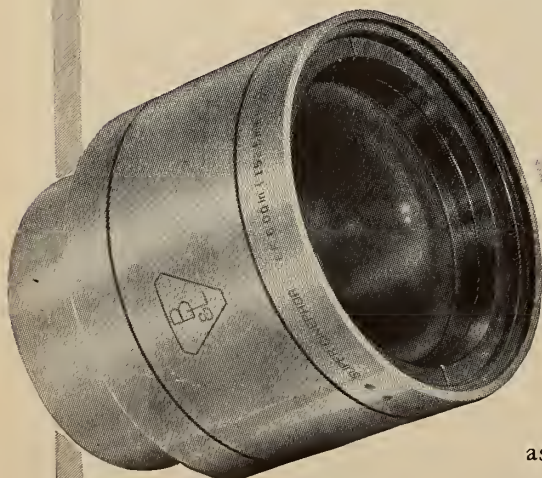
which is disposed at right angles to the plane of the drawing, embraces the plane deflection mirror, thus avoiding any shading of light by the rear part of the ring.

In such an arrangement the length of the positive carbon is not restricted by the optical system and may be made as long as necessary to permit uninterrupted operating during the normal projection period, even with extremely high

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consumption rate. Consequently the current density of the positive carbon is no longer limited by the admissible mechanical length of the carbon with respect to the optical system.

The optical illumination system, on the other hand, may be constructed taking into consideration only optical requirements regardless of the minimum length of positive carbon. Thereby the efficiency of the optical system may be made a maximum. Ventarc lamps employing ring cathodes will permit the production of a light flux as high as from 50,000 to 60,000 lumens. This will be of great importance for background projection and theater television employing the Eidophor process.*

H. Ventarc Lamp Light Output

The light output of Ventarc lamps ranging from 20 to 100 amperes arc current is shown in Fig. 10. It must be emphasized that the indicated light output may also be obtained in practical use in contrast to customary construction.

1. The air stream concentration of the arc ensures invariable brilliancy and brilliancy distribution. Furthermore the plane of the crater is continually kept at the focus of the reflector by the high-precision feed control.
2. The new reflector consists of a concave metal structure supporting a re-

tion of the arc distribution of screen lumens, according to the requirements of "standard illumination". The quotient Q may serve as quality coefficient of a lamp.

'Total Lumens' Misleading

It must be remembered that the quotation of "screen lumens" with poor uniformity and lack of color homogeneity across the screen is valueless and only leads to wrong conclusions. As may be seen from Fig. 10, the quality coefficient Q of a Ventarc lamp is situated in the vicinity of 6 lumens per watt.

Finally, it may be remarked that the configuration of the arc discharge of a blown arc is independent from the position of the lamp in space, so that no difficulties will arise even from a steep inclination of the light throw.

The Ventarc lamps with ring cathode are superior to all other lamps as regards safety and reliability of operation. Due to the low consumption rate of the ring edge, no adjustment of the negative electrode is necessary during a normal projection period of 20 minutes. In the event of a breakdown of the positive feed, the positive carbon burns back towards the positive head. As the negative electrode is kept fixed in space, the arc approaching the blower nozzle on the

positive head is blown out by the air current. Damaging of the positive head or of the blower nozzle is thereby positively excluded.

[NOTE: IP will endeavor to provide the answers to any questions arising from the foregoing article.—ED.]

Record 16-mm School Order to RCA

The largest single order ever placed by a public school system for sound motion picture projectors has been awarded by Pennsylvania to Raymond Rosen Engineering Products, distributors of RCA visual products. RCA Model 400 Senior 16-mm equipment to the number of 572 constituted the order.

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side-to-center ratio 80%

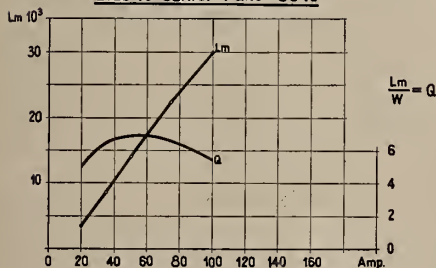


FIGURE 10

flection and a protection layer applied by an evaporation process and which latter protects the reflecting surface against splashes from the positive crater.

3. The mounting and adjustment of the new reflector eliminates all deformations of the reflector that might arise during operation of the lamp. This in combination with the highly resistant reflecting surface ensures constancy of the light output in this respect, too.

The light efficiency of a high-intensity lamp may be determined by the quotient Q of screen lumens to electric consump-

* A new system of theater television, developed in Switzerland, which uses a special electro-mechanical accumulation process to give, with ordinary lighting, projection on full-size screens. The system, still in the stage of early development, is quite promising, according to a description thereof in the SMPTE Journal for April, 1950.

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Conversion to Safety Film 85% Complete

BEARING out predictions made by IP over the past several months, Eastman Kodak Co. has announced that it has ceased the manufacture of positive nitrate film and that the conversion to the use of acetate (safety) film within the industry is now 85% complete. Complete changeover of equipment for the making of positive safety film should be accomplished within the next several months.

Despite this unexpectedly fast progress toward complete conversion, it is estimated that nitrate film, with its requisite

handling and projection precautions, will continue to circulate among theaters for at least another 18 months. This means the dashing of hope by exhibitors and exchanges that a speedy reduction in insurance rates could be effected on the basis of greatly enhanced safety factor of acetate stock.

Newsreels Still on Nitrate

Chief stumbling block at present to complete conversion to safety film by the distribution field is the reluctance of the newsreels to use acetate stock. This atti-

tude is predicated on the fact that newsreel prints have a comparatively short life no less than that the changeover to the higher-priced acetate would cost the reels approximately \$250,000 additional annually. Newsreels are now supplied with nitrate positive film from ample warehouse stocks which are estimated to be sufficient to last for several years.

Technicolor has just recently started to print release prints on safety film, with every indication that another six months will see its entire output being printed on the new stock.

No little impetus to the speedy industry-wide conversion to safety film was lent by the decision of Eastman Kodak to make available to Du Pont a limited supply of acetate stock for distribution covering the period of time necessary for the latter to perfect the development of its own safety film.

DuPont Aims at Nylon Film

Du Pont is now working feverishly on a safety film stock which differs radically from the Eastman type in that it utilizes a nylon base (it *would*) which, it is asserted, will neither shrink nor expand, will afford greater transparency and prove to be exceptionally durable. This stock will be ready within two years.

A recent bulletin from the National Board of Fire Underwriters states that "there is universal agreement that the storage of cellulose acetate film does not require any special fire hazard precautions." Acetate film is characterized as "slow-burning, the fire hazard being classed as somewhat less than that of common newsprint paper in the same form and quantity."

Edge-Marking Important

Considerable emphasis is placed by the Underwriters on the necessity for careful examination of the entire print by all film handlers for the words "Safety Film" which should appear at frequent intervals along the edge. IP has frequently stressed the possibility of certain insert sections of a safety print having been printed on nitrate stock.

The ignition temperature of safety film is placed by the Underwriters at between 700 and 800 degrees F., as compared with the 300-degree mark for nitrate stock. However, decomposition of safety stock begins at 500 degrees F, with accompanying irritating fumes which, it is said, are not considered to be toxic.

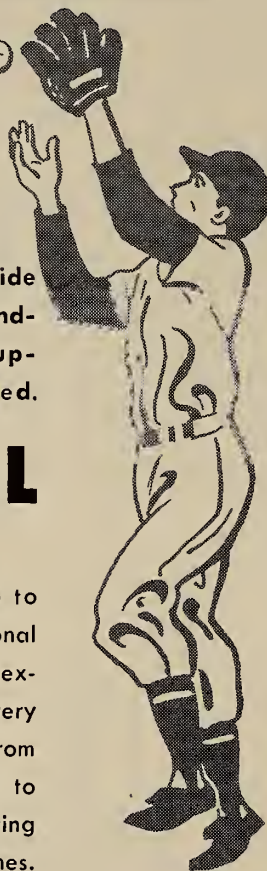
The Underwriters' bulletin concludes by stating that "the most important safety factor with regard to cellulose acetate film is in its slow combustion, and any fire can be easily extinguished by the application of water or smothering, much in the same manner as fires in ordinary combustible materials."

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Cinematic Progress in 1949

Excerpts from Report of SMPTE Progress Committee†

MUCH of the progress in the motion picture studios during 1949 is traceable to a determination for greater economy in production without altering the box-office drawing power of the product. Some of the techniques and equipment which have been received primarily on an economy basis would have been accepted on any other basis because of their apparent value; others have found limited use while some care has been taken that the new techniques do not reduce box office value, they have had considerable influence on the type of productions made. A number of the points of progress in the era of the economy move are so simple as to have been overlooked when total picture cost was not such an alarming factor.

Progress in picture and sound reproduction is highlighted by successful efforts to provide more screen light for large indoor and drive-in theaters.

35-mm Photography Advances

Progress in the fields of motion picture film, cameras, and studio lighting is again largely a consolidation of the use of techniques and equipment previously announced.

The low shrinkage safety base film of the triacetate type, introduced by Eastman Kodak, has been received with considerable favor. It is currently being used for release prints and studio work prints. There has been some application as a sound recording negative and experiments are in progress to determine its adaptability to picture negative films. While the prime purpose of the use of safety film is to decrease operating hazards, the economies effected by its use are of considerable magnitude, from reduced building costs and simpler equipment to lower insurance charges and transportation.

Smoke detection equipment was adjudged of little value in preventing loss in film storage vaults. Other tests conducted by this committee on the decomposition of nitrate film have shown that nitrate film in the third and fourth stages of decomposition will spontaneously ignite at temperatures as low as 120 F.

Eastman has introduced, on an experimental basis only, a 35-mm negative-positive color process. This involves a camera negative film which yields a complementary color negative, with integral color masks, which is printed onto a color print film yielding a positive color print. The color print film may also be used with separation negatives. The color

forming couplers are incorporated into the print film.

Both Eastman and Du Pont have been experimenting with a negative film which involves the use of three emulsions, two of which are subsequently stripped from the original base and mounted on new film bases in the laboratory before development. Although various problems connected with this process are not completely solved, both companies successfully performed the operation on considerable quantities of film. There are no known commercial uses of the process.

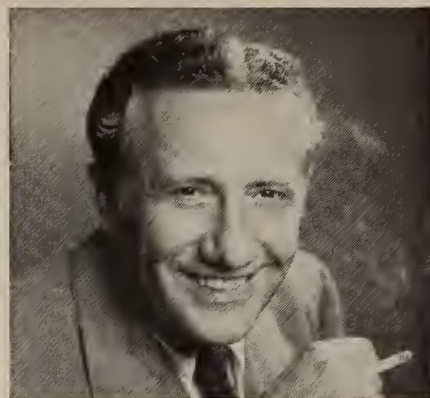
A three-color printing method was described for the Cinecolor process.

Lighting Equipment, Techniques

Carbon arc trims for the MR "Brute" lamp which operates at 225 amp have been modified to reduce noise level both at striking and during burning periods.

The reflector type of incandescent lamp, of which the photoflood and photo-spot are examples, has found added use particularly on documentary type and other pictures where low-level effect lighting is indicated.

The mercury-cadmium lamp, called the compact source lamp in England where it was first developed, has been slow in achieving acceptance by the British motion picture industry. It is now being used, to a limited degree however, for both black-and-white and color photography. Lamps are available at 2½ and



K. A. VAVERIS—President of the Family Drive-In Theatre, Johnstown, Pa., says:

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5-kw ratings with a few 10-kw lamps available on an experimental basis.

Samples of 5-kw mercury-cadmium lamps, operating at approximately 70 amp at 70 arc volts, have been delivered by American manufacturers to interested companies in Hollywood.

Ordnance Work Technique

Extensive ballistic data on long-range and guided missiles in the U. S. Army missile program are obtained with the

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New York, N. Y.

† J. Soc. Mot. Pict. & Tv. Eng., May, 1950.

extensive use of motion pictures. Tracking telescopes have been developed which are in effect motion picture cameras of very long focal lengths. Telescopes up to 16-in. size, and focal lengths up to 80 ft. have been used. Stationed 40 miles from the launching site at an elevation of 8,000 ft., these instruments have photographed V-2 missiles and furnished their trajectories to an altitude of approximately 35 miles. Orientation of the axis of a V-2 missile at an altitude of 20 miles has been determined with a probable error of 0.6 deg.

A pressurized ballistics range (U.S. Navy) permits the study of aerodynamic characteristics of missiles at different Reynold numbers, and will lead to a better correlation between small models and full-scale data. The range is located in a steel tube, 3 ft. in diameter and over 300 ft. long. Pressure up to five atmos-

pheres and down to one-hundredth of an atmosphere can be obtained. Twenty-five photographic stations are located along the tube to photograph the missile by the direct shadowgraph method using high-speed flash actuated by the missile as it passes between a source of light and a photocell. An electronic chronograph measures the time intervals between stations.

Bell & Howell has announced a new series of coated lenses for 16-mm cameras developed in co-operation with Taylor Hobson, England. These lenses are supplied with click stops. The focal lengths of the series are chosen to provide uniform magnification steps. Of particular importance is the improvement of corner resolution in the new series.

35-mm Sound Recording

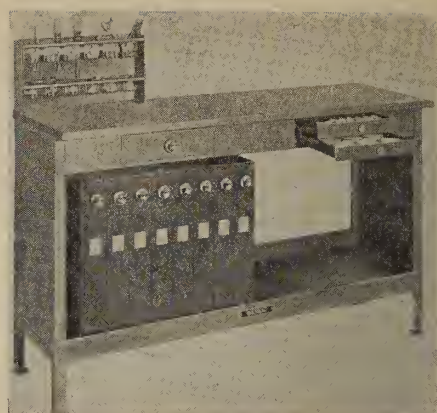
Magnetic recording is gradually being integrated into the production of motion pictures in England, Europe and the U. S. Its freedom from photographic and developing distortions, the possibility for somewhat smaller and lighter recording equipment, and operating economies are the factors stimulating its use.

A number of new magnetic recording and reproducing devices were introduced, such as the modification of theater-type soundheads for magnetic reproduction, and combination photographic and magnetic recorders and reproducers. Westrex and RCA modifications were available to convert photographic recorders, soundheads, and film phonographs for both photographic and magnetic film.

Magnetic Speed, Facility

An eight-tape single master tape printer will produce more than 960 hours of recording per day. Of particular interest is the economy of the magnetic printing process, as the master does not deteriorate during use. No further processing of the copy is required. The speed or "exposure" during printing is not critical.

Warner Brothers Pathé News have



New National Theater Supply deluxe rewind table has every facility for film storage, inspection and splicing. Other, smaller models are available.

made use of RCA's magnetic recording facilities to speed up the final preparation of newsreel material by the editing office, as well as to improve the sound quality of newsreel releases.

Paramount Studios have been using a magnetic sound recording channel for production shooting, the entire weight of which has been reduced to under 150 lb. Utilization of magnetic recording is being expanded and within a year all production, scoring and dubbing recording will be on magnetic film. Photographic film

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will continue to be used for sound negatives and for release prints.

Columbia Studios soon expect to go into a method of re-recording in which multi-track 35-mm magnetic film will be used as the medium for storing various dubbing components, for later use in the dubbing of foreign versions, Tv versions, 16-mm versions and normal domestic release.

Dubbing consoles are being rewired so that the dubbing output is divided into four channels: a dialogue channel, a music channel, a sound effects channel and an over-all channel, including the normal dubbing output. The first three channels will feed the three tracks of a multi-track magnetic recorder. The last channel will feed a normal film recording channel.

When the dubbing is made, the first three channels will be used to store the result on a single 35-mm magnetic film. When a satisfactory take has been obtained, it will be transferred to film from the magnetic tape, eliminating the recording of worthless takes. The magnetic film

will then be stored for the future dubbing of various versions which will be obtained by transferring the desired number of sound tracks from the magnetic film to photographic film.

This procedure will result in the elimination of worthless dubbing takes, reduction in the dubbing time and cost of foreign versions, and the improvement in quality of all dubbed versions. It will simplify the work of supplying the laboratory with identical duplicate negatives and will reduce storage space by a factor of 15 to 1 where the original dubbing material must be stored.

[To be Concluded]

Color Tv, Tri-Dimensional Pics Predicted by Par Executive

Color Tv in theaters within a year, FCC allocation of frequencies for a network of 10,000 theaters, and new types of tri-dimensional pictures and screens were predicted by Paul A. Raibourn, Paramount v-p, at the company's sales convention. Raibourn emphasized his belief that Tv would not actually compete with motion pictures but will become an added feature, with films constituting the greater part of the program.

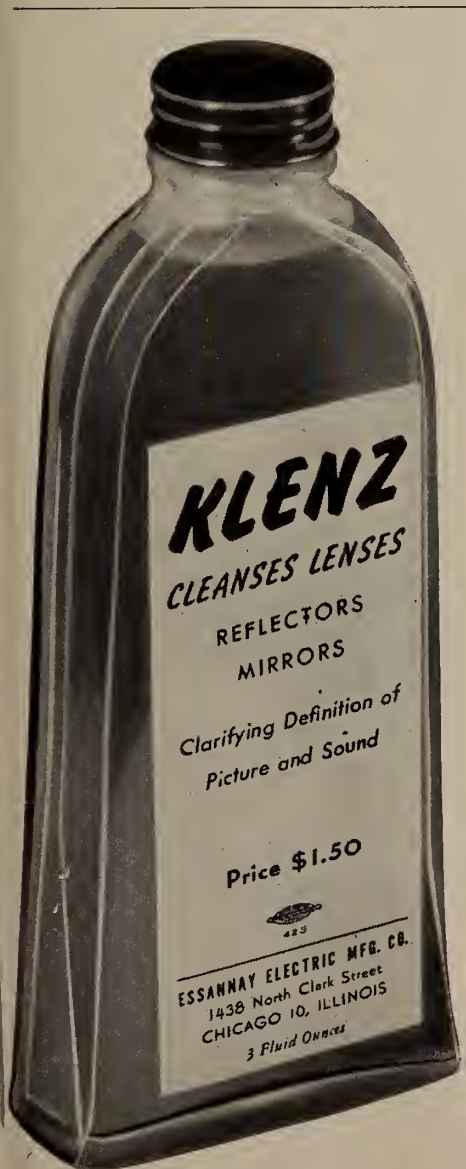
Tv has cost film theaters only from 5 to 8% of their audiences, said Raibourn, "I think we have lost the youth of the country," he said, "so we are going to have to think in new ways, young and fresh ways, and adapt Tv to the screen." He added that the average weekly film theater attendance in 1946 was 76 million, while the 1950 attendance level is estimated at 58 million.

Current cost of Par's large-screen Tv is about \$25,000, continued Raibourn, but this figure could be sliced down to \$5,000 by mass production methods. He cited a recent prize fight in Madison Square Garden which enticed 196 out of 200 New Jersey exhibitors to stay at home themselves to watch the show over Tv.

Tri-dimensional movies present no technical problems, in Raibourn's opinion, but at the moment costs for production and exhibition equipment are very high. Such films should be available to theater audiences within the next year, he stated.

EXAMINATION QUESTIONS

1. Define a "volt".
2. Define an "ampere".
3. Define an "ohm".
4. Define a "watt".
5. Define a "horsepower".
6. Define a "kilowatt".
7. Define Ohm's Law and explain how it works.
8. Define "direct current".
9. Define "alternating current".
10. Define a "cycle".
11. Define an "alternation".
12. Define a "megohm".
13. Define "electric current".
14. Define a "short-circuit".
15. Define a "ground".
16. How may the size of wire be measured?
17. Define an "electric arc".
18. What governs the size of wire used in any circuit?
19. What is a two-wire circuit?
20. What is a three-wire circuit?



GEORGE VALLEY—of the Strand Theatre in Winooski, Vt., says:

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17 FIREMEN FELLED IN NITRATE FILM FIRE

INCREDIBLE though it may seem, the danger to human life inherent in burning nitrate film still is not fully appreciated by the fire departments of some of the largest cities in the United States. Still, these fire officials are often entrusted with the task not only of formulating the regulations and policing the storage facilities for nitrate film, but they also conduct the examination of projectionists and, presumably, are competent to advise all and sundry on safety measures in connection with handling film.

The following excerpt from the *Dallas Morning News* for June 15 last is self-explanatory:

A threat of serious illness, possibly death, hovered over 17 firemen Wednesday after they were overcome by smoke and fumes while fighting a movie film fire in downtown Dallas. The firemen were believed to have been exposed to delayed action nitrate toxics that have been known to cause death many hours after exposure.

Toxicity of Nitrate Fumes

At Parkland Hospital late Wednesday the firemen were resting comfortably, but were being held for observation of any delayed poisoning that might become evident.

Sickening fumes from blazing western films at the Sack Amusement Enterprises, 308 So. Harwood, had knocked the firefighters to the floor when they entered the third-floor establishment through windows.

Inside, the films flashed fire giving off a dirty yellow smoke. Firemen later said that the quick blaze and dirty smoke were signs that the films probably were made with a poisonous nitrate base. . . .

Observed the Dallas correspondent of IP: "I'm sorry for the fireman involved in this near-tragedy, of course; but I can't help thinking it a strange thing that in a large city like Dallas the Fire Department should be so ignorant of the danger inherent in such a situation as to permit its members to attempt to fight a nitrate film fire unmasked. It's a miracle that a majority of the 17 men exposed to these fumes escaped with their lives.

"Don't forget that these fellows are supposed to teach us; but maybe we projectionists should teach them."

Renewed Warning Anent Nitrate

For the umpteenth time IP warns its readers anent the toxicity of burning nitrate film:

The toxic fumes from burning nitrate film are chiefly nitric oxides, although carbon monoxide is also generated. It is the nitric fumes which are insidious, and breathing them may bring on edema of the lungs many hours after exposure. The victim may not know of this danger and so may not seek proper medication until too late.

The chief danger from burning nitrate

film, however, is really caused by the large volume of fumes that can be given off rapidly even in the absence of sufficient air to support combustion. It is the fact that nitrate film carries its own supply of oxygen that really makes it hazardous.

Fire Departments please note.

National Exhibitor Tv Body

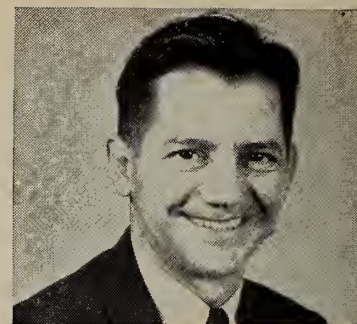
More than 3000 theaters have signed membership pledges in the newly organized National Exhibitors Theater Television Committee, sponsors for which are the directing heads of some of the largest circuits in the country.

The Committee will conduct research on the application of Tv to theater use and will work to encourage the development of theater Tv. It is expected that the new organization will play a vital role in the forthcoming FCC hearings on the allocation of theater Tv channels. All theaters, large and small, will be invited to join the Committee.

Ampro 16-mm Portable Power Speaker

Ampro Corp. has announced a new portable power speaker, using a high-fidelity 12-inch p. m. and diaphragm and weighing only 24 pounds, which more than triples the audience capacity of its 16-mm Stylist and Compact projectors from an average of about 300 viewers to as high as 1000. Up to 200 feet of cable may be used between power speaker and amplifier, thus affording the maximum best positioning.

For occasions on which extra coverage is desired, an output receptacle is provided for



A. B. GUILLORY—Partner and General Manager of the Platte Theatre in Ville Platte, La., says:

"RCA Service is right with us, striving to give our patrons the finest in motion picture entertainment—by keeping our equipment in top condition. It is a good, economical sound investment."

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connecting a second 12-inch speaker. Full details of this new low-priced speaker, Underwriter approved, may be had from Ampro at 2835 N. Western Ave., Chicago, 18.

TESMA Trade Show Bookings Record

Theater Equipment Manufacturers Assoc. reports that only 16 display booths, out of a total of 121 originally available, remain unsold for the giant Trade Show to be held at the Stevens Hotel, Chicago, for four days beginning Oct. 8 next. This is an all-time high for TESMA exhibitors.

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It's times like that—when we can buy something really important even if it is a luxury—that I feel like such a lucky guy.

And times like when my wife got sick, and we could give her the good care she needed to get well. And the swell day-in, day-out feeling of *knowing* that if an emergency comes, you've got the money to meet it.

I know the luckiest day of my life was when I signed up to save regularly through the Payroll Savings Plan at the office. I'd tried every which way to save before, but, brother, this *automatic* way is the only way that *works—for you—all the time!*

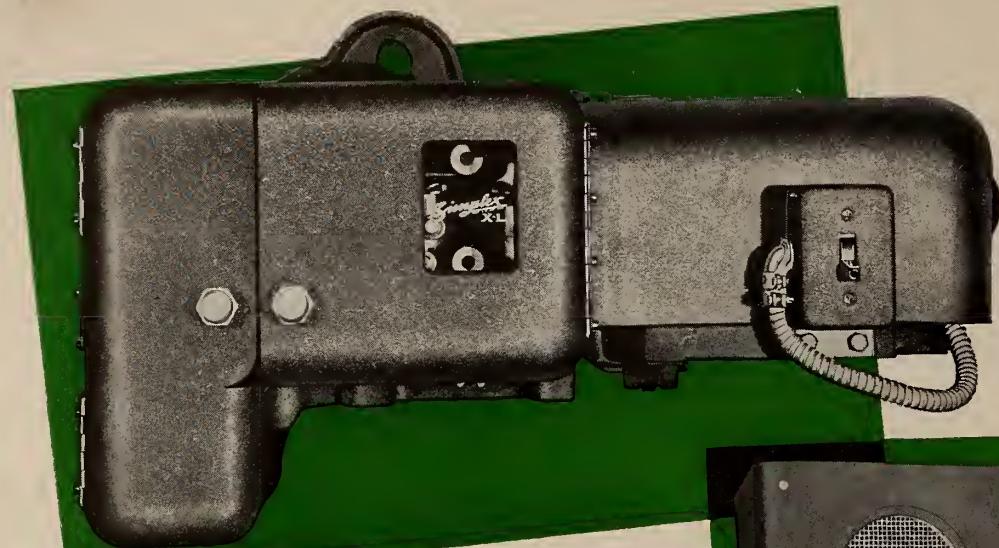
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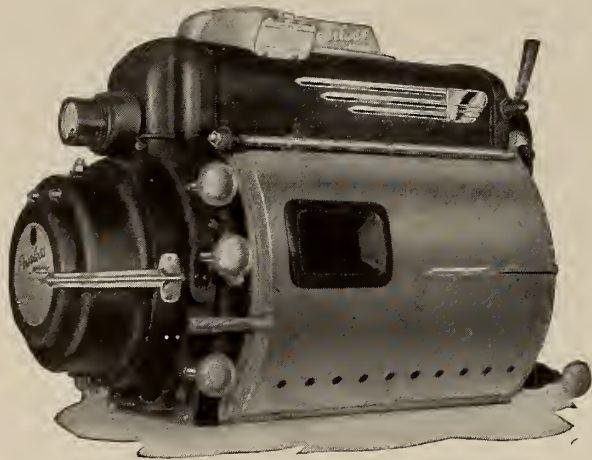
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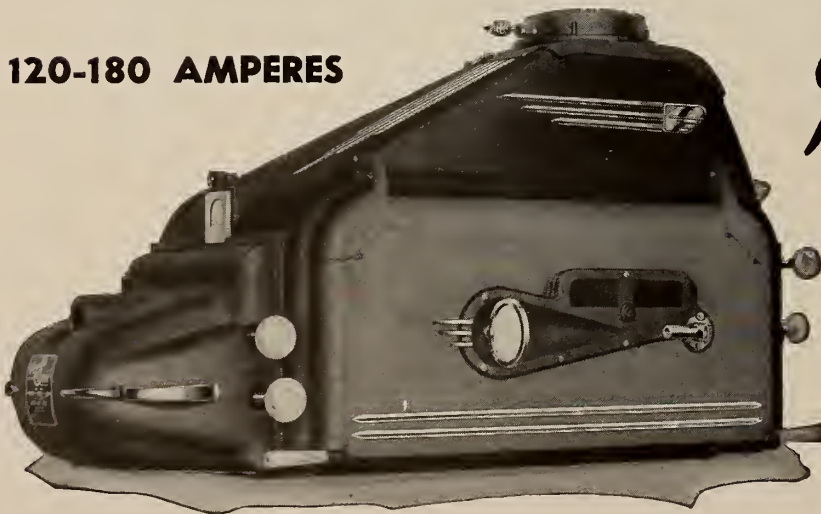
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HENRY B. SELLWOOD, *Editor*

Volume 25

AUGUST 1950

Number 8

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MONTHLY CHAT

THE constantly expanding Safety Film program, which sailed along smoothly since its introduction in the latter part of 1948, has lately come a cropper for some inexplicable reason, with the result that not a few film breaks have interrupted shows and occasioned a not inconsiderable degree of resentment on the part of projectionists. Such are the reports filtering through to IP these days.

Whatever the reason for this sudden flareup in the field—whether inefficient exchange procedure, carelessness on the part of our own people, the projectionists; the absence of proper side markings on film stock, or a possible change in the formulae of film cements—the fact remains that criticism of Safety Film was never more pronounced and widespread as it is now.

Carelessness on the part of someone along the line from film manufacturer to theater projection room is definitely indicated, we think. Without trying to absolve projectionists of a portion of the blame for this situation, it would seem that faulty exchange work is the chief culprit. Eastman Kodak insists that careful inspection on its end makes it impossible for any film footage to be shipped out with proper markings. Still, release prints that are a jumble of both nitrate and acetate film continue to turn up in the projection room. The chief complaint by projectionists seems to center on leaders and tails; but it should be borne in mind that newsreel release prints still are all on nitrate stock, requiring considerable care when spliced into the middle of a program.

Despite the insistence of some projectionists to the contrary, the splicing of Safety Film, afforded the proper cement, entails only slightly more care than does nitrate stock. Any good all-purpose cement, of which there are at least three on the market, will do the job satisfactorily. Splicing technique for Safety Film involves three main requisites: Complete scraping of both sides of the film ends to be joined, the minimum amount of cement necessary to effect full-area coverage, and a ten-second period for holding the film in the splicer. Proper procedure has been explained in detail in IP on several occasions.

We've seen the automatic stamping machinery work at Eastman and know that any slip-up at that end would apply to very few feet of film; and with projectionists now having mastered the splicing procedure it seems highly unlikely that the fault rests in this quarter. We're inclined to rest the blame with the film exchanges, wherein undermanned staffs make for a large measure of error.

Overall, projectionists will simply have to exercise greater care and patience, because as always it's their show to put on.



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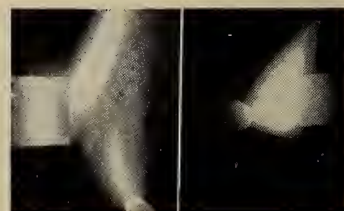
The Twin Open-Air Theatres in Oak Lawn, Illinois, wishing to give their patrons the finest, brightest projection available, are now using "National" "Hitex" Super High Intensity projector carbons.

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Projector Shutters: Design, Performance

By LARRY DAVEE
Century Projector Corporation

IN WHICH TWO ARDENT PROTAGONISTS OF TOP-FLIGHT PROJECTION
EXCHANGE VIEWS, BASED ON LONG EXPERIENCE, OF A VITAL ORGAN OF
THE PROJECTOR ANATOMY. FURTHER COMMENT THEREON IS INVITED.

THE Robert Mitchell article,* while well written and instructive, includes several statements which we think are not correct statements which we think are not technically correct and which therefore should be matters for close attention by your readers. For example, the statement:

"A disc-type rear shutter, in order to be equally efficient, must be somewhat larger in diameter than a front shutter."

We hold this statement to be not a fact. As a matter of fact, with the new 4-inch diameter projection lenses the front shutter intercepts a larger diameter light cone than does a rear shutter. The beam of light which the shutter intercepts also increases in diameter as the shutter moves away from the projection lens.

Also open to serious question is the statement:

"A single disc-type rear shutter of the usual size, and located about 5 inches from the aperture, transmits from 45 to 50% of the total projection illumination."

Single Disc-Type Shutters

A single disc-type shutter usually has cutoff blades of approximately 90 to 108 degrees. Only on the Century Model C

projectors, however, was a rear shutter of 90 degrees used for all lenses. With a 90-degrees shutter, the light transmission is 50%, no matter where the shutter is placed with respect to the aperture. A shutter of 108 degrees used on competitive equipments will give a light transmission of 40%.

As a matter of fact, Century Model C projectors can be used with a single rear shutter having a cutoff blade of 82 degrees, giving a light transmission of approximately 54.4%. Thus, a single disc-type rear shutter of usual design will give approximately 40 to 54% of the total projection illumination.

Century has always asserted that a Model C mechanism with single shutters would give as much light as the front-and-rear-shutter combination. If the statements regarding shutter efficiency in IP's article be true, then the Century claim is more than substantiated.

The reason why the barrel-type shutter is inherently inefficient, in our opinion, is the design impossibility of obtaining a peripheral speed of the cutoff blade without making its diameter so big as to

cut the light beam at the point of its largest diameter.

Shutter design is of so fundamental a nature in the projection process as to hardly require such an extended discussion as in the article under consideration.

Two Major Factors in Design

There are only two major factors in the design of any shutter, in our opinion: speed of light cutoff obtained by increased peripheral speed, and smaller light diameter. Double rear shutters reduce this cutoff time in half. Rear shutters are of value only in reducing the heat on the film. If it were not for the heat factor, it would be immaterial whether the shutters are in front of the projection lens or at the rear.

A factor controlling shutter width is gear backlash between the shutter shaft and the intermittent cam. The fewer gear meshes and the less backlash between these two units, the smaller the cutoff blade can be. Any mechanism having more than two such meshes, we hold, is inefficient, since eventually wider shutter blades must be used to prevent travel-

* "Notes on Modern Projector Design," IP for July, 1950, p. 5.

ghost. The Century design provides for the closing of this mesh to remove *all* backlash as the gears wear.

In Rebuttal:

ROBERT A. MITCHELL

MR. DAVEE criticizes the statement: "A disc-type rear shutter, in order to be equally efficient, must be made somewhat larger in diameter than a front shutter." He maintains that a front shutter intercepts a larger diameter light cone than a shutter in the rear, especially when projection lenses 4 inches in diameter are used; and he also believes that the beam of light which a front shutter intercepts increases in diameter as the shutter is moved away from the projection lens. "The smaller diameter of interception being as close to the lens barrel as possible," says he.

These opinions need detailed analysis to show that they are incorrect, and that the statements made in my article are technically correct.

I stated that a front shutter must be positioned in the plane of the "aerial image" in front of the lens in order to obtain the sharpest cutoff, thus permitting the shutter blades to be narrowed to a minimum. This implies, rightly, that the diameter of the aerial image—a reduced image of the lamp mirror or condensing lens—is generally less than the diameter of the projection lens.

Experiment With Aerial Image

Projectionists can convince themselves on this score by blowing cigarette smoke in front of the projector while in operation. A distinct "hourglass" form of the light-beam issuing from the lens will be seen in most cases. The larger the lens and the shorter its focal length, the more pronounced the hourglass form of the beam.

The waist, or constricted part, of the hourglass beam will be seen to be positioned from 2 to 4 inches in front of the lens tube. This waist, at its narrowest point, is the plane of the aerial image; and if a dark surface is interposed in the beam at this point, a clear, reduced, inverted image of the lamphouse mirror will be formed. Even the hole in the mirror and the positive carbon support will be visible on the dark paper or cardboard!

The diameter of the waist (aerial image) usually lies between 1½ and 2½ inches. When an old-type mechanism employing a single front shutter is used, the shutter should be placed in the aerial plane to give the most rapid cutoff. The projectionist should actually see the little image of the mirror on the revolving shutter during the projection of films!

If the shutter is moved out of this very critical plane, either toward the screen or toward the lens, the cutoff will be less rapid, and the shutter blades must be made wider in order to avoid image scintillation (a defect some projector manufacturers are pleased to ignore) or, worse, actual travel-ghost.

It must be stressed that the diameter of the lens has absolutely nothing to do with the diameter of the aerial image, i.e., "fast" and "slow" lenses of the same focal length produce images of the same size under identical optical conditions. Neither does the picture aperture influence the size of the aerial image. The aperture merely affects the distribution of illumination over various parts of the aerial image.

To be more specific, here are a few facts which Mr. Davee may verify by actual test.

Working Basis For Tests

CASE 1. Working distance of mirror, 25 inches. Mirror diameter, 10 inches. Projection-lens E.F., 4½ inches, *any diameter.*

Aerial-Image Data: Diameter, 1.85 inches. Distance from the front of lens tube, 2¼ to 3¼ inches. Distance from effective plane of compound projection lens, 5.49 inches.

Note: The diameter of the arc-lamp beam 5 inches behind the aperture, where the usual type of rear shutter must work, is approximately 2¾ inches in this case.

CASE 2. Working distance of mirror, 30 inches. Mirror diameter, 16 inches. Projection-lens E.F., 4 inches, *any diameter.*

Aerial-Image Data: Diameter, 2.17 inches. Distance from the front of lens

Motiograph AA Guide Rollers

To the Editor of IP:

Paragraph five of the article "Notes on Modern Projector Design" (page 6 of your July issue) states:

"It appears to the writer that a set of flanged guide rollers, one at the top of the gate and the other about an inch above the aperture, provides the best solution to the problem of side-away. But no projector having this type of guiding rig has yet come to our attention.

We wish to direct your attention, and that of your readers, to our description of the Motiograph AA projector:

"The film is guided over the tracks with a complete absence of side-away by means of rugged, *self-adjusting guide rollers located just above and just below the aperture opening.* The guide rollers run on hardened pivot-type, internally-lubricated bearings. They are large in diameter and are made of hardened steel to insure extremely long life."

FRED C. MATTHEWS
Motiograph, Inc., Chicago, Ill.

tube, 2¼ to 3¼ inches. Distance from effective plane of lens, 4.62 inches.

Note: Diameter of arc beam 5 inches behind aperture is approximately 3¼ inches in this case.

CASE 3. Working distance of condensing lens, 14.3 inches. Condenser diameter, 7 inches. Projection-lens E.F., 4 inches *any diameter.*

Aerial-Image Data: Diameter 2.13 inches. Distance from the front of lens tube, 2½ to 3½ inches. Distance from effective plane of lens, 5.56 inches.

Note: Diameter of arc beam 5 inches behind aperture is approximately 2¼ inches.

The conditions governing the formation of aerial images are given by the following equations, in which *y* is the distance of the aerial image from the effective plane of a compound projection lens, *x* is the diameter of the aerial image, *d* is the working distance of the mirror or condenser, *m* is the diameter of the mirror or condenser, and *f* is the E.F. of the projection objective.

$$y = \frac{df}{d-f} \quad x = \frac{my}{d+f}$$

$$x = \frac{dfm}{d^2 - f^2}$$

I arrived at my light-transmission percentages by a tedious process of examining projection quality in the field and by refusing to tolerate bright-image tremble of 24 minute movements per second ("scintillation") visible from the front row of seats in average-size theaters employing excessively intense screen illumination.

The phenomenon of scintillation, described in my article, gives even a still scene or stationary title a "movie" look. A truly *still* scene on movie film should, in my opinion, be almost indistinguishable from a projected slide. When projection is *that* good (and it can be), we shall not have to worry about the life-likeness of the motion depicted upon the screen.

Minimum Standard Cited

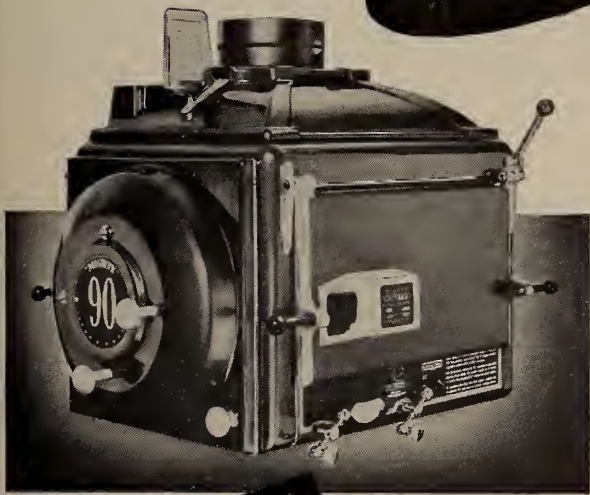
No projector should employ a *single* disc-type rear shutter having blades as narrow as 90 degrees unless: (1) the screen illumination is none too good, (2) the front row of seats is abnormally far from the screen, or (3) quality projection is not the primary consideration. In fact, 99 degrees is the best minimum. But I personally should feel safer in a high-class operation with a shutter having 108-degree blades (40% transmission), depending on an arc of suitable power to provide the desired intensity of screen illumination. Screen lumens are cheap in theaters of average size: it is easy to get plenty of light without shaving the shutter past the point where the

THE STRONGEST BIRD

The ostrich (*Struthio Camelus*) is by far the most powerful bird, and the largest living bird, attaining as much as 8 feet in stature. It has in its legs the largest muscles of any bird. The kick of an ostrich, usually directed forward, has been known to kill horses and men. The short wings, with their beautiful plumes, help lift its 200 to 300 pounds weight. With its amazing stride, of 25 feet in full run, it can obtain a speed of 60 miles per hour. Contrary to general belief, it does not bury its head in the sand. It has been hunted with such persistence, and exported in such numbers, that it is now practically extinct in its native haunts of Africa and Asia.



STRONG STRONGEST



THE STRONGEST LAMP

Theatre men are agreed that the Strong Mighty "90" is the peer of all projection arc lamps. This 75 to 130 ampere reflector arc lamp, with exclusive Lightronic Automatic Focus Control, at 90 amperes projects 21,000 lumens.

Outstanding features include: Forced air-cooled feed mechanism. Low operating temperatures. Bi-Metal Lightronic Tube controls both carbon feed motors. Simple feed rate adjustment. Big 16½-inch reflector matches high speed f1.9 lens. Air stream arc stabilization. Unit construction permits instant removal of major components. Rugged burner mechanism. Complete combustion of black soot. White deposit on reflector prevented.

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I would like a demonstration of the Strong Mighty "90" in my theatre, without cost or obligation.

Please send free literature on the | | Mighty "90"; | | Mogul Lamp;
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Theatre _____

Street _____

City and State _____

projection quality demanded by a "class" clientele deteriorates.

Most drive-ins, on the other hand, strain for adequate picture brightness, hence can get away with projection which would sabotage a "class" theater or a private preview room. And the "stinker" circuits which avoid big-town competition don't give a hoot about quality, or competent projectionists, either. Tremble and travel-ghost are the least of their worries.

I agree with Mr. Davee that shutter design is fundamental; but I certainly do not agree that a "long" discussion of these fundamentals is out of order. Simplex has amply demonstrated with the new X-L projector what can be accomplished when these fundamentals are put into practice.

Of course, we must use rear shutters to reduce heating of the film. But, as I hope I have succeeded in demonstrating, if it were not for the heating factor, the front shutter should be used because it can be made more efficient than the single disc-type rear shutter. The double disc rear shutter and the conical shutter are almost equally efficient, and superior to the older types. However, lumen-dizzy designers can ruin these by cutting them down too much.

Any projector employing a 3-to-1 Geneva movement and a modern, quick cutoff shutter, and giving more than a 55% light-transmission, cannot produce the highest quality picture when screen foot-candles exceed 20 (measured with shutter running, and without film). A strong statement, perhaps, but I'm sticking to it.

In connection with this very same matter, attention focuses upon "comparative" photometric measurements. First, however, may I inquire how it is proposed to measure and rate "travel-ghost content"? I suspect that some machines having no travel-ghost content whatever may be found on the market. But since photometric measurements are largely superfluous for determining light-transmission efficiency, except when the shutters are adjustable (as all of them ought to be), I might suggest that the tests, devised by an engineering committee, concentrate entirely on movements of the screen image during the intermittent termini—this in the fond hope that a few manufacturers may be induced to widen their shutter blades a trifle in the interest of picture quality.

Brochure on New Walker Screen

A handsome and informative brochure on the new Walker screen has just been issued by National Theater Supply Co., distributors, and is available to all for the asking. This new screen, having a metalized filter coating, is said to provide sharper contrast, greater depth, detail and definition, and to make the "blacks" in a film image look blacker.

Types of Projector Shutters Now in General Use

THE accompanying drawing shows front and rear shutters on a common shaft; counter-rotating double rear shutters of conventional diameters and shaft locations, and the single, rear, conical shutter now utilized by the Simplex X-L mechanism. All comparative figures in this drawing are based on the beam angle from an F: 1.9 light source.

When the well-known rear, disc-type shutter is used, the light beam is interrupted at about $5\frac{1}{4}$ inches from the aperture, and the leading edge of the shutter will pass through approximately 53 degrees (1/163 second) to complete the light cutoff.

When a conventional double shutter is used, the cutoff action is approximately twice as fast, and the leading edges of each shutter will pass through approximately $26\frac{1}{2}$ degrees (1/326 second) to complete the light cutoff.

When the single conical shutter of the X-L type is used, the light beam is interrupted at approximately $\frac{1}{8}$ inch from the aperture, and at such a distance the leading edges of the conical shutter will pass through approximately $24\frac{1}{2}$ degrees

(1/352 second) to complete the light cutoff.

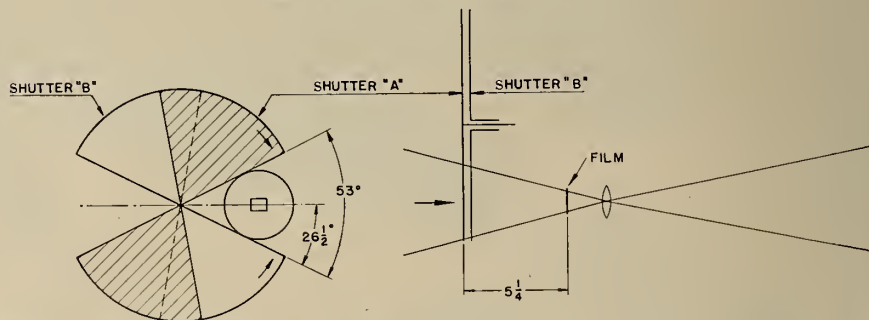
It is obvious from the foregoing paragraph that the blades of the conical shutter may be made smaller than the combined effective blade angle of either type double shutter; and it is equally obvious that smaller shutter blades mean increased light transmission.

The aforementioned conditions apply to both the leading and trailing edges of all types of shutter blades—i.e., the closing or the opening of the light beam.

Competent projectionists understand, of course, that the light-transmission efficiency of a shutter is not dependent solely upon geometrical figures, there being other important considerations such as the distance of the shutter from the focal point of the lens, and the amount of oscillation the shutter undergoes while operating, which is dependent upon the *mechanical construction* of the shutter no less than upon the type of drive mechanism.

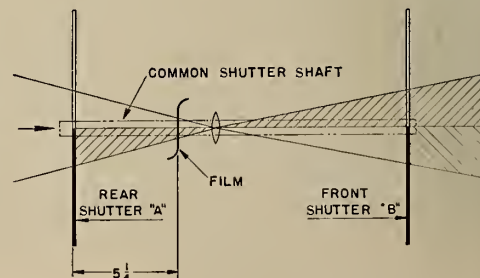
In this connection, see page 14 of this issue for an interesting exchange of views upon this topic.

DOUBLE REAR SHUTTERS

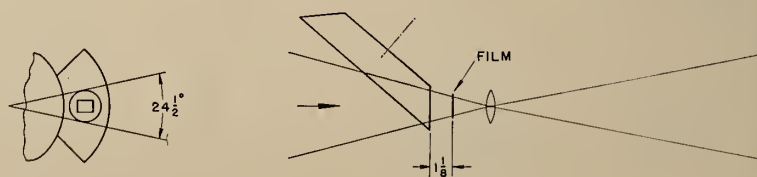


FRONT AND REAR SHUTTERS

RESULTING LIGHT CUT-OFF IS THE SAME AS SHOWN ABOVE SINCE THE LOWER HALF OF THE LIGHT BEAM IS CUT OFF BY THE REAR SHUTTER "A", AND THE UPPER HALF OF THE LIGHT BEAM, AFTER REVERSAL BY THE PROJECTION OPTIC, IS SIMULTANEOUSLY CUT OFF BY THE FRONT SHUTTER "B".



X-L SINGLE, REAR, CONICAL SHUTTER





Guardian of her most important "bath"...

COSTLY shots like this might be so much spoiled footage... save for the vigilance and knowledge of the laboratory man.

He makes sure that the dailies take *their* all-important bath... inspecting, testing, keeping constant check as the exposed footage runs through the developing, fixing, and washing tanks and driers.

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film representing "box-office gold" literally slips through his careful fingers... motion pictures owe much of their well-earned reputation for technical excellence.

This skill is more effective... the burden of constant vigilance lessened... when he works with dependable film of superior quality. That's why he always welcomes the family of Eastman motion picture films.

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FIG. 1. Film container, showing thermocouple wires.

Spontaneous Ignition of

Decomposing Nitrate Film[†]

By JAMES W. CUMMINGS

National Archives

AND

ALVIN HUTTON—HOWARD SILFIN

National Bureau of Standards

The accompanying article, although slanted especially at storage vaults and processing centers, is of the utmost importance to everybody who handles film. See also "Nitrate Film Ignition by Static Discharge" in IP for February, 1950, p. 12.

DURING the abnormally hot summer of 1949, numerous fires involving cellulose nitrate motion picture films were reported in New York City and adjacent areas. These fires occurred in processing and reclamation plants and in standard film storage facilities. Losses resulting from these fires, other than those of real property, were severe, for the majority of the films destroyed were original negatives and master copies, some dating back to the "silent era."

Due to the fact that these fires occurred either after working hours or on week ends, no casualties to personnel resulted, although some firemen were treated for smoke inhalation.

National Archives and Bureau of Standards engineers who investigated the fires could find no evidence that they were due to the negligence of personnel or the careless use of cigarettes or matches, but rather they appeared to have originated in the *spontaneous* ignition of deteriorated nitrate film.

The summer of 1949 was one of the hottest recorded in the New York area, with the temperature reaching a maximum of 98 F. The mean high temperature for the months of June and July, 1949, was 83.1 F., as compared to a normal for the period of 79.3 F. The rainfall for the entire month of June was only 0.16 in. in contrast to the normal rainfall of 3.33 in. for the same period.

Self-Ignition Doubted Previously

The lack of rainfall and the unusually high temperatures of the period seemed to create ideal conditions for the development of spontaneous ignition in film stores.

Prior to the investigation of these fires it was generally believed that nitrate

tion as an *inherent* hazard in decomposing nitrate film.

Samples in various stages of decomposition were supplied by the National Archives for the purpose of simulating conditions which may have prevailed at the fire locations. These samples were stored in a special chamber, the temperature of which was controlled and recorded.

The films were packed in individual cans with each wrapped in mineral wool to retain the heat of the exothermic decomposition reaction. The ambient temperature in the chamber was initially 95 F. and, at intervals, was increased by small increments.

After 17 days of this treatment, one 1000-foot reel of film, initially in an advanced stage of deterioration, ignited; the ambient temperature in the chamber

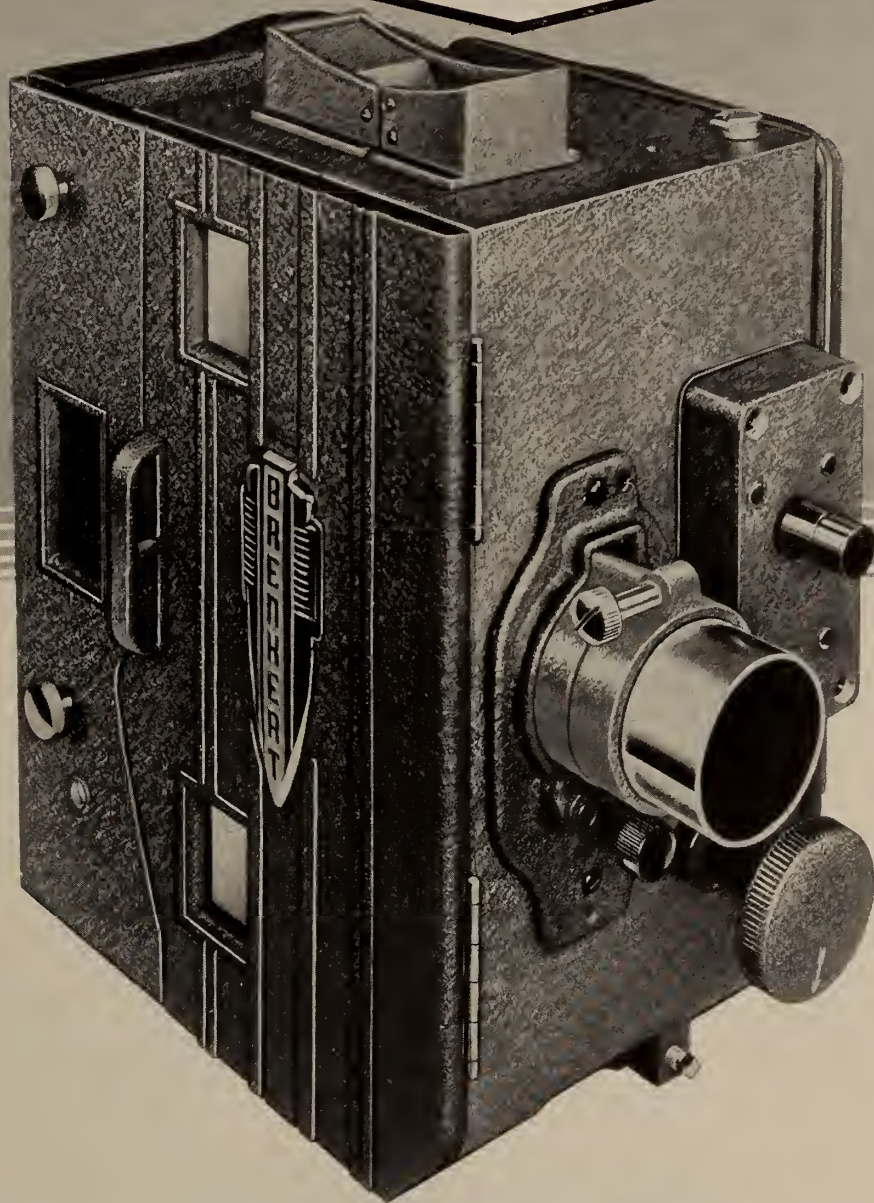
film did not ignite spontaneously at temperatures likely to be encountered in a normal film vault. At the request of the National Archives, the Fire Protection Section of the National Bureau of Standards instituted an investigation to determine the possibility of spontaneous igni-



FIG. 2. Reel of film which had spontaneously ignited during a test.

[†] J. Soc. Mot. Pict. & Tv Eng., March, 1950.

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Biggest Value!*

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Other features of the RCA "60" such as the *sturdy intermittent* and *heavy-duty* gearing provide highest quality projection and trouble-free performance. The RCA "60" assures rock-steady projection throughout its long life. It's today's best projector buy for the medium-size and small-size theatre!

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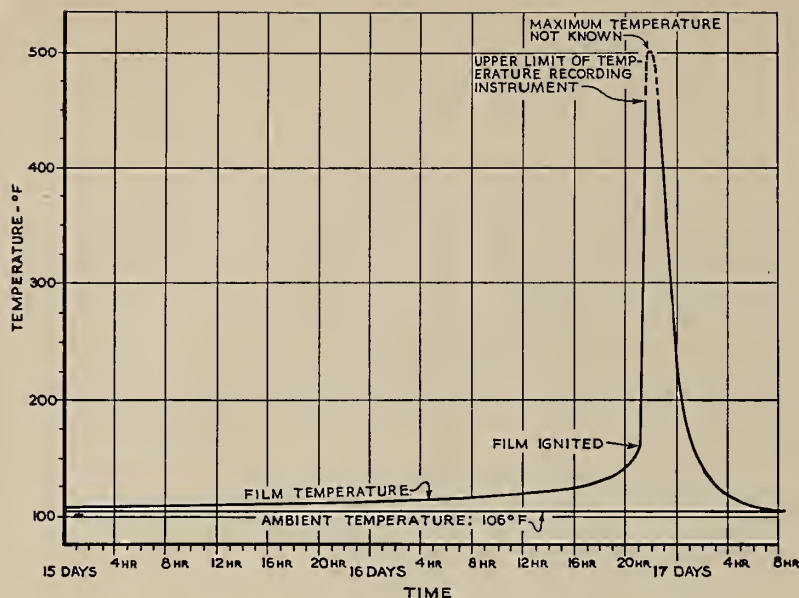


FIG. 3. Temperature during the critical period of spontaneous ignition.

at the time was 106 F. Subsequently, with the ambient temperature at 120 F., another roll of film ignited.

Lowest Ignition Temperature 106 F.

Tests made by the National Bureau of Standards have not yet been completed, but so far some important conclusions can be drawn. Self-ignition temperature, which is dependent upon a number of factors, was not the same for any two samples. The lowest temperature leading to ignition was 106 F.

Because the number of samples investigated was small, it is doubtful whether this is the lowest temperature at which a reel of film can self-ignite. One reassuring aspect of the results of the tests to date is that no film in good condition has self-ignited.

At the moment, no one can predict what the weather conditions will be during the coming summer, and it is quite possible that other regions may be confronted with abnormally high temperatures such as prevailed in the Atlantic Coastal Region during last year. This possibility offers the chance that there will be a recurrence of regrettable film fires.

The hazard should not be underestimated, for, even with abundant water supplies, cellulose nitrate fires are difficult to combat. Nitrate base film contains oxygen in chemical combination and does not need additional oxygen to sustain combustion. Furthermore, the fumes given off by its combustion are highly toxic and seriously hamper the fire fighters. *They contain oxides of nitrogen which, if inhaled, can be fatal.*

Shortage of municipal water supplies in many areas presents an acute control problem definitely requiring the constant maintenance of every safeguard.

The results obtained in the Bureau of Standards tests indicate that good film

does not self-ignite at ordinary storage temperatures. Therefore, the logical approach is to remove from storage all film showing signs of deterioration. Such film can readily be found by regularly scheduled inspection of stored film stocks. Inspecting personnel should be trained to recognize decomposing film by appearance, with its condition classified according to the following categories.

Various Stages of Decomposition

In the first stage of deterioration the photographic portion usually shows an amber discoloration with fading of the picture image.

In the second stage, the emulsion becomes adhesive and the film convolutions tend to stick together during unrolling.

Rolls of third-stage film have annular portions which are soft, contain gas bubbles, and emit a noxious odor easily recognizable.

In the fourth stage of deterioration, the entire film is soft, its convolutions

welded into a single mass, and frequently its surface is covered with a viscous froth. A strong noxious odor is given off, unmistakable to inspection personnel when once identified.

In the fifth and final stage, the film mass degenerates partially or entirely into a brownish acrid powder.

Deteriorated film in the first and second stages is photographically reproducible. If the matter recorded is important, the film can be copied and the original disposed of. If the material is not valuable, the film should be disposed of at once.

Adhesiveness prevailing in deteriorating film may cause the emulsion to become detached from the base while unrolling. This frequently can be prevented by slowly unrolling the film in a bath of carbon tetrachloride under precise laboratory control. *This should be done only in adequately ventilated areas.*

In the third stage, only small portions of the film may be reproducible. The reproducible portions should be separated, if valuable, from the rest and copied. After reproduction, the entire original film should be immediately destroyed. In the fourth and fifth stages, film is photographically worthless and should be destroyed at once without further consideration.

Recommended Disposal Methods

Films of stages three, four and five, designated for disposal, should be immediately submerged in water-filled drums. They should be carried in these drums to a remote, uninhabited area approved by fire authorities and destroyed by burning. The ground on which the film is to be burned should be free of brush, grass, leaves and combustible litter.

Burning should be confined to batches of not more than 25 pounds, as the heat

(Continued on page 30)



FIGURE 4
Sample of
film in
the third
stage of
decomposition.

everything a Projectionist ever dreamed of...

say the members of I.A.T.S.E. Local 414

International Alliance of Theatrical Stage Employees
and Moving Picture Machine Operators
OF UNITED STATES AND CANADA M. P. M. O. LOCAL NO. 414

AFFILIATED WITH
AMERICAN FEDERATION OF LABOR
KANSAS STATE FEDERATION OF LABOR
WICHITA TRADES AND LABOR ASSEMBLY



P. O. BOX 741

WICHITA, KANSAS
June 30, 1950

National Theatre Supply Co.
223 West 18th Street,
Kansas City 8, Missouri.

Gentlemen:

Am writing you on behalf of the members of Local 414 and myself, to thank you for the recent opportunity of seeing the new Simplex X-L Projector. We are most enthusiastic about this mechanism, and feel that it is just about the last word in equipment. In fact it seems to have everything a Projectionist ever dreamed of, especially the new Upper and Lower Magazines, as they seem to be a must with this mechanism, for the improvements of the upper magazine tension device and the even tension take-up are features that have long been needed.

Two of our newest Drive-In Theatres, The Meadow Lark and the Pawnee have both installed Simplex X-Ls, which are the first of these projectors in Wichita. And speaking of the Meadow Lark, thereby hangs a tale. The owners had already purchased all equipment, including projectors of another make, and had it on the job ready for installation. In as much as this was to be a large deluxe 900 car drive-in, one of our enterprising members advised the owners that only the best projectors should be used and talked them into buying and installing Simplex X-Ls; and from all reports it was a wise move.

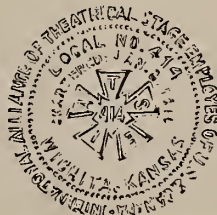
The writer has long been a Simplex booster, having worked on Simplex Projectors almost exclusively since 1914; in fact the first Simplex I operated bore the serial number 311, and I still have the name plate as a souvenir.

Again we thank you, and to coin a phrase, "When Better Projectors Are Built, Simplex Will Build Them."

Sincerely yours,

Seth E. Barnes
Seth E. Barnes, Sec'y.
I.A.T.S.E. Local 414.

SEB:em

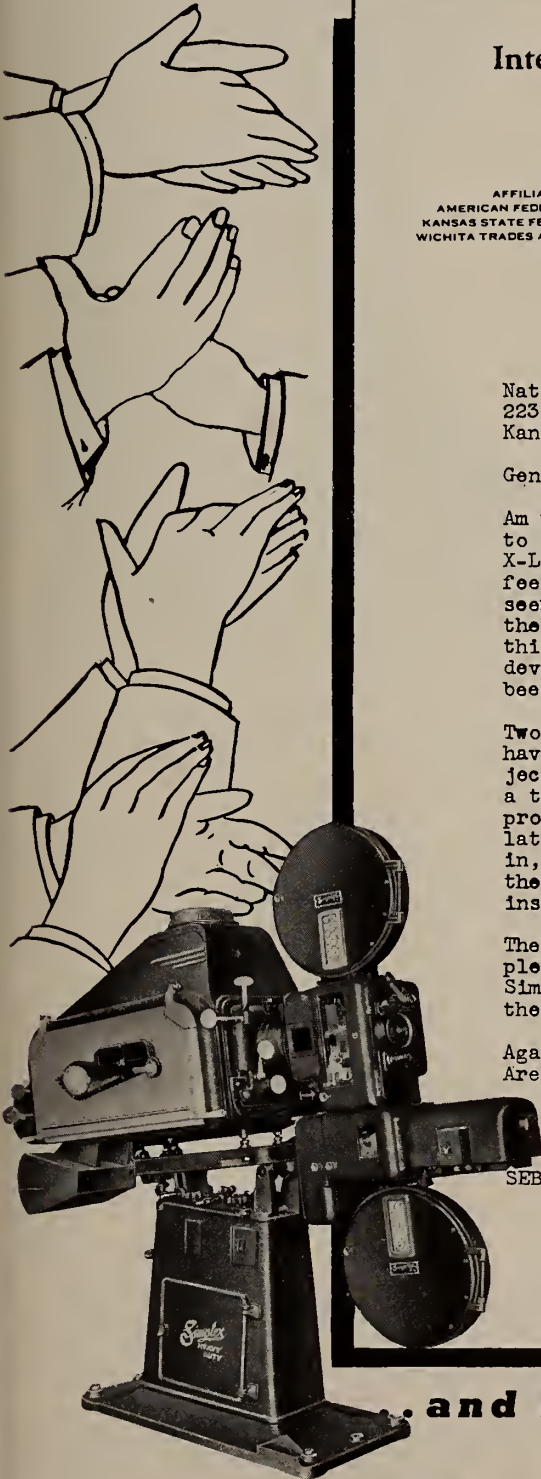


and so will you, when you see the NEW

Simplex
T. M. REG. U. S. PAT. OFF.

X-L PROJECTOR

Manufactured by International Projector Corporation • Distributed by National Theatre Supply



For a **FAR MORE** **BRILLIANT SPOT**

THE **STRONG** **TROUPER** HIGH INTENSITY SPOTLIGHT



**A PORTABLE A.C.
CARBON ARC THAT
PRODUCES A STEADY,
SHARP UNIFORM-
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Draws only 10 amperes from any 110-volt A.C. convenience outlet. Adjustable, self-regulating transformer, an integral part of the base, makes the use of heavy rotating equipment unnecessary.

Easily operated. Automatic arc control maintains constant arc gap, free from hiss or flicker. A trim of carbons burns one hour and 20 minutes at 21 volts and 45 amperes.

Silvered glass reflector and two-element variable focal length lens system.

Horizontal masking control. Can be angled at 45 degrees in each direction. Color boomerang contains six slides and ultra-violet filter holder.

Mounted on casters. Easily disassembled for shipping.

THE STRONG ELECTRIC CORP.

"The World's Largest Manufacturer of Projection Arc Lamps"

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Please send free literature and prices on Strong Spotlights.

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Dual-Screen Images From a Single Projector?

Sure—to the Vanishing Point

PRODDED unceasingly by those who are obviously much more interested in the new and novel rather than in the refinements of time-tested procedures and equipments, IP offers here a modicum of data anent the ultimate, the inevitable, the inescapable development of the drive-in theater (and, probably, of technological lunacy). These data are based on the quadruple-screen drive-in (yes, *four* screens) opened recently at 138th and Halsted streets, in Chicago; but they are also applicable to similar imbecilities perpetrated elsewhere in this erstwhile domain of rationality.

Basis of these multiple-screen drive-ins are the optical effusions of Par Products Corp., of California, whose inordinate pride in their accomplishment is so pronounced as to dictate refuge in utter silence when queried by IP as to the fundamentals of its unique (?) contribution to modern optical practice.

Par Products Corp. offers a "Super Luxar" lens and a "Biluxor" beam-splitter which, *say they*, will enable the projection of satisfactory multiple-screen images from a single light-projection source. It requires no great powers of deduction to assay the degree of efficiency, or lack of it, attained by these units.

Projector, Arclamp Setup

The aforementioned four-screen drive-in utilizes 4 Simplex X-L projectors and 4 Peerless Hy-Candescent, 180-ampere projection arclamps. The picture size of each of the four screens is 42 feet, and the arclamps pull 180 amperes. Incidentally, the description and sketches presented here were obtained through the courtesy of J. E. McAuley Mfg. Co., manufacturer of Peerless lamps.

Figure 1 shows a two-projector setup which serves to project simultaneously a picture on two screens. The sectional drawing in Fig. 1 indicates that the primary mirror surface is 50% clear, with the mirror stripes which aggregate the other 50% of surface being $\frac{1}{2}$ inch wide and spaced $\frac{1}{2}$ inch apart. All these are first-surface mirrors and are coated—coated, that is, to the best ability of their sponsors, because extreme difficulty has been experienced in preserving the anti-reflection properties of these optics, without which they are hopelessly disqualified as an adjunct of even the lowest acceptable projection rating.

In Fig. 2 is a left-hand view of the projector with the beam-splitter in position, the view being as though looking into the beam-splitter along the optical axis of the light beam being projected to

screen No. 2 from this particular projector.

Without laboring the point, it must be obvious to anyone having even the most elementary knowledge of the projection process that such a setup, which involves robbing the optical system of not less than 50% of the available light—not to mention the corollary defects of chromatic and spherical aberration and other ills to which even a good optical system is subject—is a travesty on even the most rudimentary requirements for the projection of a motion picture screen image.

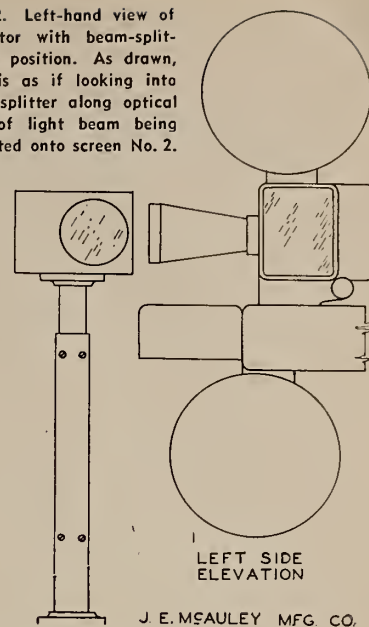
Drive-In's Present Low Status

IP readers, it is hoped, are mindful of the fact that even the best drive-in is woefully deficient on the counts of both *incident* and *reflected* screen light, as witnessed by the futile efforts to obtain a needle deflection on a light meter with even a conventional one-screen projector setup.

Along come these dual-image sponsors who, proposing at the very outset to reduce the light-transmission efficiency of the optical system by at least 50% of that mark which is now regarded as merely terrible, ask we projection people to bear witness to our own dumbness relative to the projection of a visual image.

Toleration of such practices as are cited herein cannot fail but to reflect grave discredit upon both the art and the craft of projection, no less than to con-

FIG. 2. Left-hand view of projector with beam-splitter in position. As drawn, view is as if looking into beam-splitter along optical axis of light beam being projected onto screen No. 2.

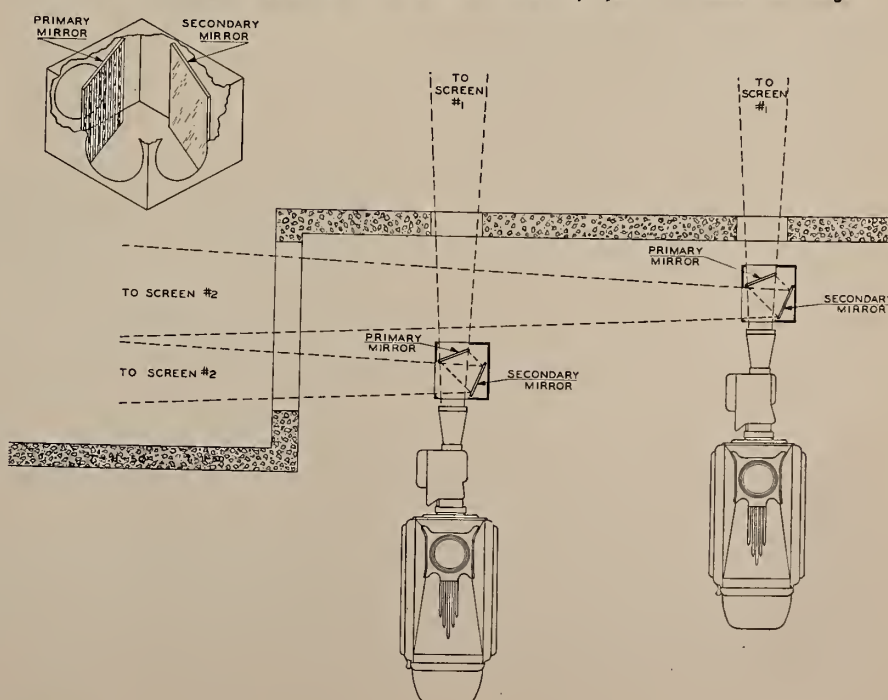


stitute a mockery of the sincere efforts of those who have labored through the years to attain ever higher standards in terms of equipment and technique.

While not unmindful of the temporary economic benefits which may accrue to the proponents of such schemes, IP regards such practices as a form of economic prostitution which can only redound to the discredit of the motion picture industry as a whole.

NOTE: It is barely possible that the sponsors of this technical atrocity, while impervious to the more secluded exchanges guaranteed by the U. S. mails, will take umbrage at this uncomplimentary estimate of their technical proficiency and be goaded into telling we neophytes the what and how of this system of projection.—Ed.

FIG. 1. Two-projector setup for two-screen simultaneous projection of same film image.



From a Manufacturer's Casebook

Third of a series of articles anent fundamental technical data as culled from the files of manufacturers. This contribution by The Strong Electric Corp., Toledo, Ohio, manufacturers of arclamps, rectifiers, mirrors and other projection equipment.

TO STRONG ELECTRIC CORP.:

I SHOULD like to know how I can increase the light output of my low-intensity lamps. The throw is 140 feet, and screen size is 16 x 21 feet. This lamp is rated at 40 amps, 27 volts; but I have stepped this up to 46 amps, 36 volts.

Under this setup I have great difficulty in maintaining the arc gap at the proper 5/16 inch. Naturally, my trouble here is that the motors on my lamps won't feed fast enough. I have a low-voltage generator. I am using the 6-7 mm carbon trim, with a 5 1/4-inch lens.

While I am getting a fair light, I believe I can do much better with my setup.

FROM STRONG ELECTRIC CORP.:

To burn 45 amperes in your 1 kw, 40-ampere lamps it is necessary to change lead screws (explained in bulletin attached). Then, to attain full benefit of this higher current, you should also change to Specification No. 77 reflectors and move the lamphouse forward so that the center of the new reflector is 24 inches from the film aperture.

You evidently have turned the rheostat on the lamphouse all the way up in an attempt to speed up the motor to shorten the arc gap; but if you will refer to the instruction book you will see that this rheostat has no effect on the arc gap length, but is used only to adjust for any drift of the arc towards or away from the reflector which might cause the arc to drift away from the focal point of the reflector. This rheostat is generally set at position 6 or 6 1/2.

Lamp Rating Vitaly Important

This 1 kw lamp was originally designed to burn only at 40 to 42 amps, and the automatic feature of the motor automatically tends to maintain this arc amperage by separating the carbons if the generator is turned up too high. Ac-

cordingly, when you turn the power up to 45 amperes the control system lengthens the arc in an attempt to bring the current back down to 40 amperes, which is the correct current for this lamp.

Turning the generator up will automatically lengthen the arc gap, or by turning the generator down will shorten the arc gap to maintain the arc current at 40 amperes, so if your arc is too long it simply means that your generator is turned up too high.

If you want to change to burn 46 am-

peres, it will be necessary to change the lead screws in each lamp. Instructions to make this change are in the attached service bulletin. The 46-ampere lead screws cost \$12 each.

Proper Reflector, Working Distance

Burning at 40 amperes, the proper reflector is our Specification 69, which has a 4-inch focus from the arc to the reflector and is 30 inches from the reflector to the film aperture. However, at 46 amperes the diameter of the arc crater is increased so that you should change to a Type 77 reflector which has a 24-inch working distance. Then you move the lamp ahead so that the center of this new Specification 77 reflector is 24 inches from the film aperture. In this way you gain all of the increase in light from the larger 46-ampere arc crater. This new 77 reflector lists at \$26 each, f.o.b. Toledo.

The Impact of War on the Tv Industry

THE impact of the Korean war on the fortunes of the motion picture theater box-office is subject to various interpretations dependent in large measure on the degree of optimism possessed by the onlooker. But there are two factors upon which there is practical unanimity of opinion:

1. Construction permits for additional Tv stations now seem as dead as a dodo; and

2. Every day that passes before a state of "emergency" is proclaimed will enable the manufacturers and distributors of Tv home receiver sets to pursue unabated their goal of saturating those markets which already enjoy Tv reception.

Smaller Community Should Benefit

Should this state of affairs persist for an extended period of time, it is obvious that those large cities, and environs, now favored with Tv signals will probably become a greater threat to the film theater box-office, the while those areas that have been looking forward to the erection of localized Tv stations will have to do without such facilities for an indeterminate period of time. Thus, the small-town and rural community theaters are given a breather at the expense of their big-city brethren.

The one definite point is that the upward spiral of Tv receiver production will be curtailed, with the best guess being that the cut-back will be about 20%. For the past six months about 2 million Tv sets came off the production line, with the Tv industry shooting at a

yearly total of 6 million sets. If the war situation worsens, it is expected that the year's output will not exceed 5 million sets. All of these receivers, of course, will go to those areas where Tv reception is possible. If the war gets really tough, all Tv set production will cease.

Two major factors make the situation more acute: already there has been considerable "scare" buying, with an official of a N. Y. City chain describing the demand as "like Christmas." Second, with higher taxes and possible other deterrents to a peacetime social life, Tv shapes up as a good investment to assure diversion and entertainment at home.

New Tv Stations Unlikely

As for the possibility of okaying either more Tv broadcast stations (or the advancement of color Tv) these advances would entail considerable additional research by highly skilled personnel, retooling and circuit changes, more equipment and extensive promotion. Such a development is hardly in the cards during an emergency.

Similarly, the erection of new stations, which would require substantial amounts of steel for transmitting towers and much equipment, hardly seems likely. Strictly aural radio stands to benefit by these circumstances. News will continue to be a prime radio diet, a field in which Tv, strangely enough despite its access to visual aids—maps, charts, etc.—has not done too well.

Thus, it all adds up to a respite for the rural communities in terms of continuing good movie theater box-office; but the fate of the large-city theaters will rest in the lap of the gods until the year-end totals on Tv receiver set production are available.

Sense of Frustration, Futility?

The Theater Owners of America which has been strutting its stuff on a variety of industry-problem fronts—and particularly as an avowed earnest collaborator with the SMPTE to further the cause of theater TV—is omitted from the listing of sustaining members in the current (July) issue of the SMPTE Journal.

Reason as announced by the SMPTE: the TOA failed to pay the \$500 dues for which it signed as a sustaining member.

Notes on Modern Projector Design

By ROBERT A. MITCHELL

IV. Conclusion

THE soundhead should be an integral component of a combined sound-and-picture mechanism in order to save weight, space, parts, trouble for the projectionist, and expense for the exhibitor. The writer, although recognizing the indisputable merits of the "motion-picture," "stereopticon," and "projected-image" optical systems for sound-on-film reproducers, would not have the "cylindrical-lens" system passed by without special praise. Adjustments in this system are less critical than for any other. It is extremely compact and possesses a high degree of efficiency, permitting exciters to be under-voltaged. Originally developed for 16-mm projectors, the cylindrical-lens system has been successfully adapted for 35-mm sound reproduction by DeVry.

But both the "motion-picture" and the "stereopticon" optical systems can be made almost as compact as the cylindrical-lens system by employing a periscope prism between the light-slit and the objective sound-lens so as to provide a right-angle turn in the optical axis of the sound optical system. This method is used in the Roxy sound head which was manufactured by Eugen Bauer in Stuttgart, Germany.

The British SUPA projector employs the projected-image optical system similar to that utilized in the American Western Electric Mirophonic soundhead, except that exciting lamp, lenses, slit, and photocell all lie on one straight line, no mirrors or prisms being used. The result is a high-quality optical system, one which may easily be focused and aligned in a jiffy. Nonetheless, the SUPA sound reproducer is a bulky affair and cannot

be used in a combination sound-and-picture mechanism where space must be conserved and where a neater, more modern, better proportioned design is required than is evidenced in the SUPA.

Film Soundtrack Scanning

With the single exception of the oil-damped compliance roller introduced four years ago by W. E. Export Corp. in conjunction with the Century projector, nothing radically new has appeared in recent years in the way of "flutter suppressors" to insure absolutely uniform motion of the film past the scanning beam. The old-style sound gates through which the film was pulled by sprockets, whether damped by special flywheels or not, are definitely passé. And the rotary stabilizer, which is a hollow shell enclosing a heavy free-turning flywheel, will soon be on the way out. Sad to relate, another European "innovation" of many years ago is at last finding its way into the inner sanctum of American usage.

The German Roxy and Europe (Klangfilm) sound "adapters," as well as the built-in sound reproducer of the Ernmann VII-B projector mechanism, employ film-driven scanning drums, with the free film-loop damped by a spring-tensioned compliance roller to remove all flutter. On the scanning-drum shaft is mounted a small metal flywheel upon which is exerted a constant magnetic "drag." The idea is very much the same as that employed in the Century and Westrex sound heads, except that in these latter the incorporation of an oil-damped

"flutter suppressor" in the compliance roller insures even better filtering of irregularities from the motion of the film past the scanning beam.

The European type of spring compliance roller may be seen in the American Bell and Howell Filmosound 16-mm projector.

The complicated magnetic film drive of the SUPA sound reproducer has been the subject of much doubt and anxiety in the craft. Many projectionists hold the opinion that it is, as one engineer expressed it, "liable to error or variation." Be this as it may, it is very similar to the film drive of RCA recording apparatus and also of the Fantasound multitrack soundhead used for the road-showing of Walt-Disney's "Fantasia." The impedance (not scanning) drum is electrically driven by means of a disc-motor, the speed of which is controlled by the strength of the current fed to special windings.

Advances in Arclamp Design

In some particulars, we are happy to say, projector arc lamps embody the results of really recent technological progress. This is especially true of lamps having fully automatic arc controls. The Forest Electronic Lamp commands interest because the control of carbon feeding is completely "electronic," two vacuum-tube "timing" circuits being used to control the feeding of positive and negative carbons separately.

Certain other lamps (including the SUPA and the Motigraph-Hall rotating positive H.I. lamp) employ regulating devices which work on optical principles. An image of the arc is focused upon a thermostat or a selenium strip, either of which actuates the feeding mechanism and thus maintains the correct crater position within close limits. And for lamps which do not have automatic focus controls, there is an ingenious and inexpensive photoelectric attachment, the Arcon Projection Arc Monitor, which unfailingly signals the busy projectionist whenever the arc goes on a spree. A far cry from the days when the projectionist cranked the machine with one hand and fed the carbons with the other!

But the optical aspects of arclamp design still leave much to be desired. This may seem a hypercritical complaint to our readers in Timbuctu, where a 60% side-to-center distribution of screen illumination is regarded as quite satisfactory, but we adamantly maintain that higher standards exist. And what is more,

(Continued on Page 23)



Indicative of the recent upward surge of Tv production was the purchase recently by the ABC-TV network of this former motion picture studio in Hollywood.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

CONVENING in Detroit as these lines go to press is the 40th Biennial Convention of the IA. More than 1,100 delegates will be in Detroit to engage in week-long deliberations and conferences which conceivably, in view of the present state of flux of the entertainment world, might set the pattern for the organization for years to come.

Chartered by the AF of L on July 20, 1894, certain component Locals trace their organization back at least another seven years when they were banded together in the National Alliance of Theatrical Stage Employees. "Projectionists" was virtually an unknown word during this period, thus we shall have to defer to the stiff-necked attitude of some of our stagehand brothers who never fail to remind us of their long and illustrious battle for the organization.

Since the last convention in Cleveland, 28 new Locals have been chartered by the IA, the bulk of which are made up of theater employes, treasurers, wardrobe workers, and television studio employes. The IA official family remains the same with one exception: the election of Harry J. Abbott, president of Philadelphia Local 307, as 8th vice-president to succeed William C. Barrett, whose untimely death recently robbed the IA of a most capable official.

Convention headquarters will be at the Hotel Statler, with the business sessions

being held in the magnificent Masonic Temple nearby. Opening on Monday, August 14, the business sessions will be preceded by meetings of the 15 districts of the IA, starting Friday, August 11.

Numerous important decisions must be made at this convention, and two of the most pressing problems concern the plight of the studio workers who have been hard hit by foreign exchange restrictions which prompt the film companies to produce an ever-increasing number of pictures abroad, and, second, the matter of organizing the television broadcasting industry, with its attendant jurisdictional squabbles.

Thus far the IA has made comparatively good progress in the Tv field, but it must not be supposed that either the broadcasting interests or other labor groups intend to stand idly by while the IA strives for preeminence in this field. As for the acute studio employment situation, this is largely a matter of international economy and diplomacy, and it seems unlikely that even the most strenuous efforts by the IA will occasion any sharp change in the present status.

Nor is the theater field without its problems, with a number of factors—importantly, the retention of the 20% amusement tax and the deluge of Tv home receivers—being cited as responsible for declining box-office receipts. Significant, however, is the fact that

a good picture still does good business, and this one the Hollywood boys can't deny.

The Detroit convention promises to be one of the most important in the history of the IA. It would be idle to speculate on the outcome of this gathering, but readers of this department may expect that we shall exert every effort to render a full report of the proceedings in these columns next month.

Good Luck.

- Effective teamwork rather than obstruction is the keynote of a recent announcement which points up the continuing cooperation by RCA with the organized craftsmen of the IA. Immediately RCA announced its intention of launching a nationwide motion picture presentation service for industrial groups and other organizations which use films to tell important sales and public relation stories to dealers, distributors, stockholders, clubs, and the general public, IP queried RCA as to the type of labor that would be used on such jobs.

The answer, from Bill Jones, vice-president of RCA Service Co., was both prompt and completely satisfactory. Summed up, this answer is that it always has been and always will be RCA policy to use IA men wherever and whenever possible.

We congratulate RCA on its enlightened labor policy.

- F. P. (Reel) McCoy, secretary of Local 444, New Kensington, Penna., was re-elected secretary of the Tri-State Association (Pennsylvania, Ohio, and W. Virginia) at the Association's annual meeting last month in Erie, Penna. The IA General Office was represented by W. P. Raoul, General secretary-treasurer, and Tom Shea, assistant IA president. Representatives John B. Fitzgerald and Lawrence Katz were also present.

- Three weeks of intensive picketing by the members of Local 253, Rochester, N. Y., resulted in an equitable settlement between the Local and the managements of the Starlite Drive-In and the Rivoli Theater. Union officials com-

Participants in the 25-year membership observance by Waco, Texas, Local 597 (front row, left to right): A. M. Pudig, treas.; E. F. Roberts, v-p; Charles Keeler, sec.; Eddie Miller, b. a. of Houston Local 179 and Int. Rep.; H. F. Dunn, b. a. Second row: H. C. Yopp, C. L. Holt, C. R. Lemke, J. F. Horne, J. G. Daniel, Leslie Yates. Others honored but not present are Ed Austermuehle and J. L. Howell. Business representative Dunn proudly displays his gold life-membership card.



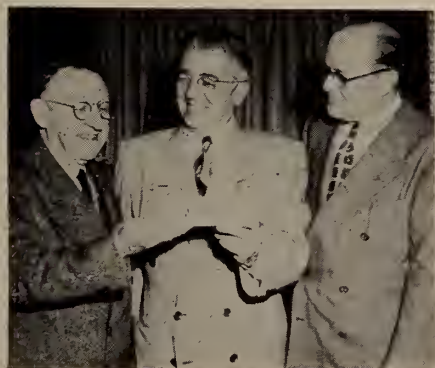
mended the AF of L members in Rochester for their observance of the IA picket line and publicly thanked their brother unionists for their splendid cooperation. Floyd B. Spencer and Fred Boekhout, secretary and business representative, respectively, of the Rochester Local, worked tirelessly during the strike period to bring about a satisfactory settlement.

- The grandson of Charles Travis, longtime member and former official of Local 314, Schenectady, N. Y., recently presented him with a great-grandchild. Charlie, nearing his 74th birthday, is as proud as a young buck and is broadcasting the news of his new status.

- Despite the handicap of a broken left arm, incurred while on vacation, Fred Stofregen, charter member of New York Local 306 and projectionist at the Capitol Theater, has been performing his regular duties at the theater without assistance from his fellow workers. Fred will not permit the men to take over any of his chores, and even though he finds the going a bit rough at times, he insists upon carrying on with his work as though he had the full use of both arms. Watching him trim a McAuley lamp with one hand typifies, we think, Fred's determination to let nothing stand in the way of doing his job—and doing it well. A determined and resourceful guy—and a swell person—Fred Stofregen.

- Setting an example to other Local Unions throughout the country, Chicago Local 110 responded to President Truman's recent radio appeal for support in the current Korean conflict by purchasing

Gene Atkinson, business representative for Chicago Local 110, hands George Moore, labor representative, U. S. Treasury Department, a check for the purchase of \$135,000 in U. S. government bonds. Clarence Jalas, secretary of the Local, looks on approvingly.



ing \$135,000 worth of U. S. government bonds. This is in addition to \$100,000 in U. S. bonds bought last November. A telegram to the President, signed by Gene Atkinson and Clarence Jalas, business

Two Recent IA-NLRB Theater Decisions

THE retention of the Taft-Hartley law on the statute books continues to be a source of irritation, and possibly potential danger, to the IA in that it necessitates infrequent but still very necessary contact with the National Labor Relations Board, which administers the law. Two recent NLRB cases are of interest.

In the first case, several out-of-town IA men working in the jurisdiction of Toledo Local 228, upon being denied full membership in that body, broke away and formed the Toledo Projectionists Association. They then asked the NLRB for recognition as the bargaining agent at a single theater, the Princess in Toledo.

Recognizing the threat posed by this move, because the issue involved the closed shop, the General Office moved in and placed its resources behind Local 228. The IA stand was that NLRB had no jurisdiction because the factor of interstate commerce was not present.

Assumes Jurisdiction; No Action

The NLRB local examiner ruled against the IA on the jurisdiction angle, holding that the Princess was a link in the Balaban & Katz circuit which operated numerous houses in various states. Despite this finding, however, the local examiner declined to grant recognition to the rump body at the Princess Theater on the ground that the "traditional pattern" of theater labor negotiations for many years had been for Local 228 to deal directly with the Toledo Amusement Managers Association.

The IA promptly appealed this local ruling on the jurisdiction issue to the National Board in Washington. The latter, by a divided vote, upheld the findings of the Toledo examiner. The net result of this ruling, therefore, is to confer jurisdiction on the NLRB in such a case but to decline to act because of contingent circumstances, such as the "traditional pattern" of collective bargaining in Toledo. Sort of a Mexican standoff.

'Small Impact' on Commerce

The second case related to a member of Philadelphia Local 307-A who was expelled from the Local and removed from his job at the Royal Theater. Unlike the Toledo situation, where the Princess Theater is a unit in a multi-state chain operation, the Royal Theater is a single neighborhood operation. IA therefore opposed the assumption of jurisdiction by the NLRB.

But the local NLRB examiner took a different view yet with the same net result as in the Toledo case, although with a different reason for non-positive action: he ruled that the Royal Theater is engaged in interstate commerce as defined in the T-H act, but because of the "small impact" on commerce in this case, the NLRB should, as a matter of policy, refuse to assume jurisdiction. The case was dismissed.

Here again the IA was confronted with the ticklish problem of whether to appeal a ruling on the jurisdiction angle. While they were pondering the matter, the General Council of the NLRB in Washington intervened by announcing disagreement with the finding of the local examiner that the impact on interstate commerce was small, adding that he favored taking jurisdiction in all such cases everywhere.

So intent was the General Counsel upon having his stand validated that he exerted extreme effort in digging up a theater in Atlantic City, N. J. (the interstate angle again) which was owned and operated by blood relatives of the owner of the Royal Theater in Philadelphia.

Again the General Office of the IA swung into action, with the result that finally the full NLRB in Washington overruled its General Counsel and upheld the finding of the local examiner in Philadelphia. Significant, however, is the fact that in neither the Toledo nor the Philadelphia case did the national board disturb the findings of the local examiners that the NLRB had jurisdiction over such cases on the basis of engaging in interstate commerce as defined in the T-H law.

Still in a Nebulous State

There the matter rests at this writing. It is almost a certainty that in any case involving a multi-state theater operation the NLRB would not only unhesitatingly assume jurisdiction but would follow through with positive action. It is also conceivable that similar action would ensue in a matter involving a large theater circuit operating in one state (*intrastate*). There is also room for speculation as to what course the Board might take in the event of any future change in its personnel, particularly in the office of its General Counsel.

At the moment this question still is unresolved, with the IA having effected a sort of "holding" action, and the NLRB having clearly indicated its right of jurisdiction but on a "yes, but" basis.

ness representative and secretary, respectively, of Local 110, pledged the support of the entire membership to the govern-

ment in its aid to the Republic of Korea. One of the Local's prized possessions is a telegram from the White House ex-

pressing the President's deep appreciation of this response to his appeal.

The \$235,000 in government bonds were purchased from the surplus of Local 110's welfare and pension fund established September 1, 1948, as part of a five-year contract with the theater owners in the Chicago area, who agreed to pay a 10% wage increase wholly into the fund. Since its inception, the fund has paid out to the members more than \$350,000 for vacations and for sick, disability, death and retirement benefits. Each member receives an auditor's report of the fund's finances at periodic intervals. In addition to the aforementioned benefits, the membership dues have been cut approximately \$100 per year per man.

- A decision in favor of Los Angeles Local 150 was the ruling handed down by an arbitration board in the attempt of the West Theaters, Inc., to nullify its contract with the Local. The theater circuit wanted to change a clause in the contract which now calls for two projectionists per shift to only one projectionist per shift. The arbitrators ruled that "the contract is unambiguous and must stand." This is an important victory for the Local and one of which the members may well be proud.

- Diamond-studded lapel buttons inscribed with the dates of their initiation into the Local were awarded to 14 members of Local 597, Waco, Texas, who completed 25 years' membership. The presentations were made at a breakfast party in the Huaco Room of the Roosevelt Hotel (Waco) on July 16 last. IA Representative Eddie Miller, who made the awards on behalf of the Local, was in turn presented with a beautiful desk set. H. F. "Pee Wee" Dunn, Sr., business representative of 597, was presented with a gold life-membership card in recognition of 27 years of service to the Local in various official capacities

- We were sorry to learn that Billy Wise, business representative of Local 297, San Diego, Calif., will not be a delegate to the forthcoming IA Convention, as he has just embarked upon a new business venture. Billy always had an eye for business and his recently opened restaurant and bar, which he has named *The Stirrup Cup*, promises to become a popular rendezvous for local celebrities. Looking after his business and fulfilling his official duties for the Local keep Billy pretty much on the go and leave him very little time for other matters.

- We received an interesting item from Syd Clarke, secretary of Local 223, Providence, R. I. The cost of living in Providence has been spiraling upward, reports Syd, with food costs alone hav-

ing risen 17% during the brief period from June 25 to August 2 (this figure is a direct quote from the *Providence Journal*). Theater business in Providence is okay, continues Syd, but the theater interests, even when confronted with cost-of-living figures from a wholly reliable source, still adhere to the notion of no wage increase.

Could it be that the exhibitors are expecting momentarily a freeze in wages, while corporation incomes will be allowed a certain "latitude" on the profit side?

- *Recent out-of-town visitors to the offices of IP:* Fred C. Matthews of Motiograph; Robert Conway, fin. sec-treas. of Local 297, San Diego, Calif., and A. E. Bradshaw, Local 175, Tacoma, Wash.

Football, Tv-Radio, Racing Take of Entertainment Dollar Zooms

College football, radio-Tv, and horse racing were revealed to be increasingly successful competitors of films for the amusement spending of American families, according to the U. S. Commerce Department. The figures, covering the years from 1942 through last year, show 1946 and 1947 to have been the best for the film industry from the business standpoint.

Overall industry income was down to \$871,000,000 last year from a high of \$1,116,000,000 in 1946, but wages and

salaries paid out by the industry were only \$20 million lower last year than in 1946. The equivalent of 226,000 full-time employees worked in the industry last year, compared with 228,000 in 1946.

A total of 250,000 persons was engaged by the industry, part-time and full-time, last year. In 1942 that figure was only 215,000, rising to 253,000 in 1946 and 1947, then dropping to 249,000 in 1948.

Total box office revenue for the successive years beginning with 1942 follows: \$1,149,000, \$1,327,000, \$1,483,000, \$1,574,000, \$1,823,000, \$1,942,000, \$1,864,000 and \$1,819,000.

Americans were reported to have spent the following millions on pix in the same years; 961, 1,038, 1,253, 1,359, 1,512, 1,407, 1,364 and 1,342. During the same period spending for college football rose from \$31 to \$106 million, on parimutuel betting from \$69 to \$233 million, on radios, phonos and other musical instruments from \$720 million to \$1,989 million.

Overall income for industry firms in 1942 was \$634 million, rising the next year to \$810 million, then \$871 million, then \$905 million and finally to the 1946 high of \$1,116 million. It fell off then to \$1,028 million, down to \$867 million in 1948 and \$871 million last year.

Hold Your Breath For Nickelodeon

Warner theaters here are testing nine-cent matinee admissions in a move to attract daytime patronage during the Summer months. Policy has been instituted at the Warner, Arcadia, Queen, Grand and Ritz theaters.

Projectionist Examination Questions

Based on Examinations by Leading U. S. Municipalities

1. That property of a lens which separates white light into its primary components is called: (a) spherical aberration; (b) chromatic aberration; (c) lens action, or (d) refraction.

2. Condenser lenses should be cleaned by a mixture of: (a) clean water and grain alcohol; (b) clean water and denatured alcohol; (c) oil and turpentine, or (d) oil and grain alcohol.

3. In order to correct a lens for chromatic and spherical aberration the lens should be: (a) made of colored glass; (b) made of several lenses which have negative and positive curvatures and are composed of different types of glass; (c) made larger in diameter and only the center area used, or (d) mounted in a barrel which contains suitable filters.

4. Canada balsam is: (a) a cement used to join lenses; (b) an oil used for lubrication of projector parts; (c) a fireproof material used in the construction of fire shutters,

or (d) a type of metallic fuse.

5. Sound waves travel fastest through which of the following mediums: (a) a vacuum; (b) water; (c) cold air, or (d) mercury.

6. Of the following substances, the one that is *not* a good conductor of electricity is: (a) silver; (b) copper; (c) glass, or (d) mercury.

7. The core of a transformer is usually made of: (a) air; (b) copper; (c) tin, or (d) iron.

8. Whenever an electrical conductor is used and the surrounding temperature is very high, the insulator on the conductor should be: (a) rubber; (b) weatherproof; (c) double cotton, or (d) asbestos.

9. The metal of which the resistance element of rheostats is most frequently made is: (a) silver; (b) copper; (c) iron or iron alloy, or (d) mercury.

10. All solid wire sizes of electrical conductors are given in: (a) circular mils; (b) Birmingham gauge; (c) U. S. gauge, or (d) Browne & Sharpe gauge.

Week's QSO Contest Among IA-IP Radio Amateurs

THE latest official list of IA members who are amateur radio operators has prompted the bustling Amos Kanaga, whose enthusiasm and drive is responsible for this department, to come up with an extension of his original idea—a week-long contest among IA men nation-wide to determine who can “work” the most brother IA members. Amos, who is secretary of Local 409, promises that his fellow “hams” will deliver some eye-opening results.

Qualifications for entering the contest, to be held Monday to Friday, Sept 11 to 15 inclusive, are very simple. First, the participant must be an IA member; second, he must have on file with Amos his QSL card or equivalent and this card

must state his IA Local Union affiliation; third, at the completion of the contest period a log sheet bearing Local Union affiliation of person and the time and date of QSO and band used should be forwarded to Amos. The exchange of QSL cards among participants is not necessary. Log sheets must be postmarked within five days after the contest ends.

The general call during the contest shall be “CQ—IA-IP Contest.”

Certificates of Merit Awards

“In addition to providing an excellent opportunity for widening craft contacts among those who have a mutual hobby,” observes Amos, “the contest will offer more tangible rewards. Certificates of

merit will be awarded to the first, second and third highest scorers, and an honorary award will go to the six next best scorers. Since most similar contests are held over weekends, our Monday-through-Friday period should prove particularly advantageous.”

Amos is a bit disturbed that the current official listing, published here, is a bit scanty to provide for a real bang-up contest, but he assures all participants that evidence of contact between IA men anywhere will be acceptable even though they are not included in the present listing. In this connection Amos states that he has the names and call letters of many more IA men whose names cannot be included in the list because they failed to indicate their Local Union affiliation. He urges that care be taken to include this information on all QSL cards.

Attention is being focused on the listing of IA radio amateurs in non-craft quarters, with the two leading national “ham” radio magazines, “QST” and “CQ,” giving favorable mention to the setup in their current issues.

So, don't forget the dates—Monday through Friday, Sept 11 to 15 inclusive—and be sure to forward your log sheet within five days after the contest ends. The address is Amos Kanaga, 623 Capuchino Drive, Millbrae, Calif.

In wishing all the boys the best of luck, Amos has only one request to make: don't ask the B. A. for time off in which to participate in the contest!

CALL NAME—LOCAL NO.

W1CBE C. J. Rowley—L. 459
W1EBO Woodrow Guile—L. 459
W1LW Norman Soules—L. 459
WINZE Arthur Madsen—L. 182

W2TSN Victor Bufis—L. 365
W2WZX Erich Patky—L. 244
W2CYQ Frank Larham—L. 108
W2ARP Fred Ramhorst—L. 534
W2NFU Sydney Trisch—L. 306
W2RUA Hugh Newcomb—L. 462
W2QYQ Alfred Beckett—L. 462

W3KNY Harris Good—L. 661
W3MEY Leo Foran—L. 335

W4FGK D. H. Knight—L. 412
W4HJC Arlie Belflower—L. 225
W4MCT Jim Davis—L. 552
W4NOM Buddy Rogers—L. 225
W4PKT M. H. Sanders—L. 507
W4CIU Bill Britton—L. 537
W4FGG Marvin Storler—L. 144

W5IIP Pat Talbot—L. 249
W5DYV Bob Belian—L. 604
W5CQ Ray J. Morrow—L. 597
W5CQQ Rajmunt J. Machu—L. 597

W6BAA Amos Kanaga—L. 409
W6UZA Malcomb Keele—L. 150
W6DPU Ray Brann—L. 150
W6PFF Frank Champlin—L. 150
W6PQS Joe Wilson—L. 504
W6ALO Tom Gentges—L. 504
W6GTP E. Schwartz—L. 695
W6MTO Leroy Wardel—L. 762
W6ABF Martin Brown—L. 695
W6DYJ Ed Pothier—L. 215
W6IV Delos Trim—L. 297
W6RKB Bob Gillespie—L. 241
W6YWC Lewis Howard—L. 162
W6EFL A. H. Whitney—L. 150
W6EAQ E. L. Cline—L. 150
W6CAQ August De Grazia—L. 150
W6CYW Frank Hemerlein—L. 150

W6KNI Cliff Schwander—L. 150
W6REH Harry Gould—L. 150
W6BPT Roy Pinkham—L. 431
W6FBW Frank Amarantes—L. 431
W6WPG Robert Hyde—L. 796
W6IDY Dom Lucido—L. 241
W6EP Leslie Hewitt—L. 695
W6HK Frank Creswell—L. 728
W6YDU C. R. Putnam—L. 490
W6BWI Harry Morse—L. 297
W6VTX Ralph Addy—L. 521
W6EIR Leroy Ward—L. 521
W6ZOK Max Miller—L. 521
W6FGV Norman Owens—L. 521
W6BEP C. C. Applegate—L. 187

W7LAT Fred Jones—L. 720
W7PEC Jim Harford—L. 720
W7AXY John Murphy—L. 91
W7ALM Chester Lamont—L. 446
W7FJZ Z. A. Sax—L. 159
W7HE Dee Hart—L. 91
W7HPF John Gilbert—L. 91
W7GXN Edwin McMurray—L. 180

W8VDP Jack Harwood—L. 160
W8BYT L. Grazier—L. 160

W9NLP Rolly Long—L. 110
W9OL W. P. Atchison—L. 323
W9NPG John Bain—L. 323
W9LBL R. B. Connelly—L. 110
W9EDW Harold Nelson—L. 221
W9RTA Herb Kleinbeck, Sr.—L. 110

W0VGC H. F. Heckel—L. 230
W0ZIM M. Geiskieng—L. 230
W0GSW Jim Evans—L. 242
W0JSU John Cresap—L. 242
W0UOP Clair Rockholz—L. 286
W0WSH Herschell Allredge—L. 443

CANADA:

VE7OT M. Thoreau—L. 348
VE3ABV Jack Snider—L. 173
VE3BAK F. Winkle—L. 173
VE3BVC E. H. Whyat—L. 173
VE3BWC Lou Lodge—L. 173
VE3DBF M. Winslow—L. 461
VE3OC H. Horner—L. 173
VE3TE Tom Burrows—L. 173

Altec Service Signs 144; 65 Drive-Ins

Altec Service Corp. has announced the signing of sound equipment servicing contracts with 144 theaters in 37 different states. Reflecting the prominent role played by drive-in theaters in the industry setup is that 65 of these contracts apply to ozoners.

Strong Issues Exclusive Arc Booklet

A new and highly interesting brochure on high-intensity reflector-type projection arc lamps, and particularly covering the new “Mighty 90” 75-125 ampere arc, has just been issued by Strong Electric Corp., 31 City Park Avenue, Toledo, 2, Ohio. Available to all for the asking.

To the Editor of IP:

I wish to compliment you upon the general excellence of IP magazine. I never miss seeing a copy every month as it is circulated among our research and engineering staff by our library, and I have been struck by the interesting articles and the clarity with which they are presented.

W. D. BUCKINGHAM, Research Engineer,
Electronics Research Division,
The Western Union Telegraph Co.

'Bastard' Carbon Arc Trim for Larger Crater Image Pickup by Mirror?—Splicing Acetate Film

To the Editor of IP:

I am operating Ashcraft Model E arc-lamps and I have until recently used a 6-7 mm high-intensity carbon trim pulling 50 amperes at 33-36 volts. From every textbook available this is quite okay. Since the end of the war we have been unable to get American or Canadian carbons, thus we burn either British or French trims. I am now burning British "Ship" carbons.

While final screen results are okay, a few operational troubles set me to do a bit of investigating. I noticed in the National Carbon Handbook that a new trim was being adapted for 16-mm projection, this combination being a 5-mm negative and a 7-mm positive. I decided to try this trim on the regular high-intensity lamp.

Larger Crater Image Pickup?

Except for a slight rise in negative carbon consumption, I believe that I have achieved improved screen coverage. Most of my operating bugs have disappeared.

I have discussed my idea with other projectionists, and although they will not alter their trims, they maintain that in theory such a combination should give better results because the area of the negative has been reduced by 1 mm. This should make possible a larger crater image to be picked up by the mirror.

If I have made a backward step, I'll be glad to go back to the regular 6-7 mm combination. Whichever way it goes, I should like to have your views.

All the boys down here have been helped greatly by the IP articles on the new Safety Base film. Our biggest headache right now is to obtain a really reliable formula for splicing the stock. Right now some of the rewind bench tops look like a dispensary.

DOUGLAS A. HARLEY
Auckland, New Zealand

Observations by IP:

Reference to the use of a 5-mm. diameter negative carbon with the 7-mm. Suprex positive is a misquotation of matter on page 81 of the current National Carbon Projector Carbon Handbook. Mention is made there of experimental work on carbons for 16-mm. projection, including the use of 6- and 7-mm. positive carbons with a 5.5-mm. (not 5-mm.) negative carbon.

This was not meant to serve as a general recommendation for use of negative carbons smaller than 6-mm. diameter with 7-mm. diameter positives. The 5.5-mm. size was used in that series of

tests because the lamp ordinarily used for 16-mm. projection employs that size negative, and the principal purpose in that work was to investigate the effect of different positives covering the range from 30 to 50 amperes. So one negative carbon size was used to experimentally cover the entire range.

Overload, Decreased Shadowing

In order to provide adequate current capacity for 50 amperes, a 6-mm. diameter negative should be used. The use of a smaller negative would be nearer overload and would result in more rapid consumption and the burning would become somewhat less uniform.

The increase in light to be expected through decreased shadowing by the use of a smaller diameter negative carbon is less than is often anticipated. For example, a 3-mm. diameter tip of a negative carbon placed 6-mm. distant from a positive crater blocks out only about 6% of the light emitted from each point of the positive crater. Reduction of the tip diameter to 2 mm. would reduce this loss to about 3%. The saving therefore would be only about 3% of the entire radiation—an insignificant gain.

Even if this 3% were allowed to get past the negative carbon, it very likely would be blocked out by the hole in the mirror, carbon holders or other lamp parts near the axis of the lamp.

It is always the better part of discretion to adhere to the carbon sizes and operating currents recommended by the manufacturers of these units, because these have in general been chosen on the basis of years of experience involving careful study and extensive experimental and developmental work.

Effective Safety Film Splicing

As for the effective splicing of Safety Film, there should be no trouble in splicing this comparatively new acetate stock provided the proper film cement be used. There are several very good cements now available to do this job,

Du Pont Ups Price of Nitrate Film

Increasing costs of production have made it necessary to raise prices of nitrate motion picture film an average of 5.3%, the Du Pont Company has announced. The change became effective with shipments as of August 7th.

Major types of film affected are nitrate release positive, which was increased from \$11 to \$11.50 per thousand feet, before taxes, and nitrate sound stock from \$13.00 to \$14.50 per thousand feet. Prices of safety stocks remain unchanged.

and do it well, notably Film-Weld, manufactured by Essannay Electric Mfg. Co. of Chicago, Ill., and distributed worldwide by Westrex Corp. and the Eastman Kodak cement.

Equally important as the brand of stock and the type of cement utilized is proper splicing technique, since acetate requires a bit more effort and care to splice than does nitrate. Proper splicing procedure has been detailed in IP on several occasions.

It should be distinctly understood, of course, that the foregoing is applicable only to Eastman and Du Pont acetate film, IP having had no experience with other types of acetate stock made in England, France and other foreign countries.—Ed.

Steady Drive-In B. O. a Surprise; Seen Gaining 'Lost' Audience

Drive-in theater attendance in the early weeks of the 1950 season is showing no falling off across the country, but instead in many sections of the country the outdoor theater box-office is running well ahead of previous years for the comparable operating period, according to reports to FILM DAILY.

It is significant, in the opinion of trade observers, that television and other forms of "opposition" are failing to adversely affect the rapidly-expanding drive-in field.

In sections where the box-office for the all-year established theater is off as much as 20%, the drive-in attendance is holding firm, and showing signs of growing as operators turn on the heat with merchandising showmanship, the field reports disclose.

Represents the 'Lost' Audience

To a large extent, the drive-in audience is described as a "new" audience, but actually it more closely approximates, at least in part, the "lost" audience of the all-year operation. In essence, it is the old-time "family audience"—Pop, Mom and the kids—now being attracted by the drive-ins.

Price is cited as one important factor—many drive-ins make no charge for the kiddies when Pop drives up, and the drive-in admission itself may be lower. Another is that there is no outlay for a baby sitter. A third is the casualness of attire permissible at a drive-in. A fourth, and it is rated a major one, is the array of added free attractions for young children—pony rides, etc. And a fifth is the improvement in drive-in programming.

Million Sets Monthly, Tv Biz Goal

Television receiver manufacturers, who reached a production rate of 400,000 sets a month in the first four months of the year, aim at 1,000,000 sets a month during the last quarter. While that rate of production is not expected to hold for more than a month or two, competition is seen forcing producers to be certain dealers will be well stocked when the demand is at its peak before Christmas. Meanwhile, the price range is downward, and competition is expected to keep prices low.

MODERN PROJECTOR DESIGN

(Continued from page 17)

certain American lamp manufacturers adhere to such higher standards.

The makers of the British SUPA, however, have aimed no higher than a 60% side-to-center distribution of light; and we suspect that a distribution of about 55% is just about all that the average user of the SUPA obtains. We therefore regard as something beyond human comprehension Mr. R. H. Cricks' opinion that the SUPA is "the most outstanding development in projection equipment for half a century." At any rate, we are glad to learn that Mr. Cricks knows what he likes, even if the vast majority of both British and American projectionists like something entirely different.

Any distribution of light on the screen under an 80% side-to-center distribution is "hot-spot" projection. Excessive fade-away may be acceptable to the "arty" boys here and abroad who go in for illuminated screen surrounds, extensive vignetting, and other grotesqueries which effectively spoil even the best picture; but this writer remains true to his oft-reiterated conviction that the motion picture screen—the *entire* screen—should be a clear, unrestricted field of dramatic power, and that the cameraman and lab technician, not the theater decorator, should introduce vignetting and other weird effects when the drama requires them.

The 'Center of Interest'

Modern filming technique is entirely capable of shifting the "center of interest" to various parts of the screen for special effect whenever necessary; and this without the use of tunnel-vignetting which runs the risk of leading the less sophisticated patron into believing that he needs his glasses changed.

The tendency of certain lamp manufacturers to exploit optical setups resulting in a degree of light distribution absolutely not countenanced by the studios photographing and printing film is deplorable. Outside of the United States it is difficult to find a lamp manufacturer who as much as lifts a finger to attain anything approaching the SMPTE standard of 80% side-to-center distribution.

Now the question arises, is the SMPTE standard high enough to satisfy the most exacting projectionists and theater owners? If the ideal distribution of 100%—perfect uniformity of illumination—resides in the back of our minds as the norm of perfection, we can never be really satisfied by anything less than a side-to-center distribution in the neighborhood of 95%.

Is it *practical* to smooth the projection light so uniformly over the entire surface of the screen? It certainly is—but *not* with present-day elliptical reflectors. Un-

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fortunately, the arclamp mirrors now in use are designed to produce as perfect an image of the positive crater on (or very close to) the aperture as possible. The crater of a high-intensity positive carbon, however, contains a highly luminous gas ball which is brighter in the center than at the edges, hence a nearly perfect image of the H.I. crater is inherently a "hot-spot" image.

It is clear that the circular spot of light thrown upon the aperture must *not* be an undistorted image of the crater at all, but a uniform field of light which is

just as bright at its edges as in the middle.

It is entirely possible to obtain such a uniform spot by making the mirror parabolic instead of elliptical, or, with greater efficiency, by using a specially "figured" weak condensing lens in conjunction with a conventional elliptical mirror to provide the necessary distortion (anti-spherical aberration), and thus "spread" some of the center light out to the edges of the spot. And why isn't this being done *now*?

We may as well ask why the Schmidt

lens, now so important in astronomy and television, was turned down by optics manufacturers as "impractical" until comparatively recently. Perhaps the answer to these questions lies in the old adage that originality is an orphan in a conventional world.

Seven Main Components

The over-all construction of any motion picture projector, however modern, reveals seven main components: upper magazine, projection head, sound head, lower magazine, motor, lamp, and pedestal. By combining the picture and sound mechanisms, the number of components is reduced to six.

The B.T.H. SUPA (Single-Unit Projection Assembly) is no exception, but it has been given the deceptive *appearance* of a unified machine by adding one more component, a massive, streamlined casing which encloses the lamphouse and pedestal, and which also houses the amplifier (presumably to benefit from the heat and dust of the arc lamp). To heighten this illusion, SUPA designers have grouped all motor, amplifier, and arc switches together on a single, centralized control panel—an open invitation to operational errors.

Most portable and amateur soundfilm projectors are also of the "single unit projection assembly" class. But the six or seven main components are present in all of them, even if arranged in such a way that modification or replacement of any component is restricted. The owner of a SUPA, for example, is prevented by the much-vaunted single unit assembly from replacing the SUPA lamp by one of superior characteristics. He finds himself stuck with the whole thing. As we might have guessed, the SUPA (and perhaps the Mark II) has had "teething troubles" aplenty. We predict that they will continue unabated.

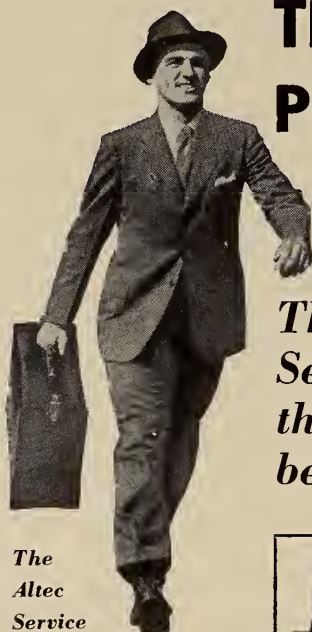
U. S. Design Leads World

In conclusion, it may be said that projector design is forging ahead, even though many alleged innovations are merely improvements on existing setups, and even though the *summum bonum* of principles already known to projectionists and designers alike has yet to be realized.

Most significant, though, is the fact that the real progress evidenced in recent years has been confined almost wholly to the efforts of manufacturers in the United States. We are by nature conservative, we are loath to plunge into the unknown sea of radical design, we are content to plod along at an even pace, for the most part. *But we do advance!*

American designing, like Aesop's turtle, is winning the race, while the skitter-witted hare, however impressive he may be by fits and starts, has all but tied himself up in knots trying to show off.

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Zenith Phonovision Test O. K.

The FCC has accepted assurances by Zenith that it will curb its enthusiasm for Phonevision and agreed to permit the long-awaited 90-day test in the Chicago area to get under way Oct. 1. Plan calls for the equipping of 300 Chicago homes for reception of the pay-as-you-look video programs, with specific offerings ordered by telephone wire and billed to the participating homeowners.

The Commission's letter to Zenith said nothing about the availability of program material for the test, but there is no indication that Zenith has succeeded in getting any of the top quality feature film product it sought for the test.

No Commercial O.K. Implied

The okay was on condition that Zenith live up to its pledges that it will give up any attempts to get manufacturers to adapt their present Tv sets so that they can later be converted simply to Phonevision. The fact that the test is to go on in no way means that the FCC will approve commercial exploitation of Phonevision.

The Commission has made it clear that its plans call for a test to prove whether the subscription video system is technically practical, with a hearing to follow on whether it would be in the public interest to license such a system.

United Paramount ½ Year Earnings

United Paramount Theaters in its first half year of operation had consolidated earnings of \$6,885,000, including \$1,225,000 of undistributed earnings of partly owned non-consolidated subsidiaries.

Earnings in the second quarter were \$3,022,000, including \$555,000 of undistributed earnings of non-consolidated subsidiaries. Six months earnings, equal to \$1.41 per share, include \$1,051,000 of capital gains, less income taxes, while the second quarter earnings, equal to 50 cents per share, include \$841,000 of capital gains, less taxes.

War Will Occasion No Print Shortage

Despite tremendous increases in the purchase of raw film stock by the Armed Services at this time, no shortage is anticipated at this time, trade sources indicated yesterday.

Pointing out that it is still too early to make a prediction on the distant future or if the conflict extends to other fronts, spokes-

Thanx for IP Back Copies

NOTE: IP extends its thanks to those readers who unselfishly offered to tender back copies of this publication in response to a request for same from a leading research laboratory. No less than 38 readers who keep files of IP offered their copies for this worthy cause.—Ed.

men stated that the raw stock manufacturing potential has been increased several fold since the end of World War II and there is currently a good inventory on hand.

Ampro 2x2 16-mm Slide Attachment

A new lightweight attachment for converting its Premier 20 16-mm sound projector into an efficient 750/1000-watt slide projector has been announced by Ampro Corp. Fitting over the lamphouse and utilizing a separate tilt platform which makes possible instant picture-on-screen adjust-

ments, this attachment projects brilliantly clear 2x2 slides.

Complete film protection is assured by a blower system which cools the lamp. Details from Ampro at 2835 N. Western Ave., Chicago, 18.

Ohio Tax Take Slumps 26%

Admission tax collection from film theaters in 27 Ohio cities for the first four months of this year declined from nine to 26%, announced the ITOA of Ohio. Most serious slump was chalked up by Cincinnati,

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where total collections are off 25.1%, with downtown houses off 16.5% and suburban operations slumping 43%.

Big Ten Program for Football Tv

The Western Conference has approved an experimental program to televise some Big Ten football games this year. Certain games will be made available to simultaneous large-screen Tv in theaters. Post-game films of contests will be available for regular Tv broadcast. Tests are planned for Detroit and Chicago.

30% Demand as Govt. Control Point

While a complete plan for the control and allocation of equipment for motion picture theaters has been drawn up as part of an over-all pattern in the event of a large-scale war, they will not become effective until the Government demand reaches 30% of the output of any given industry.

Cinematic Progress in 1949

Excerpts from the report of the SMPTE Progress Committee†

THE demand for more light for large-screen projection used in the major indoor and drive-in theaters has resulted in the announcement and application of new projectors, carbon arclamp houses, faster optics and improved carbon trims.

The problem of film heat tolerance which was the bottleneck limiting the use of these advancements was given considerable attention on the basis of compressed air on the film, heat filters in the light beam of both absorption and reflection types, and water-cooled aperture

units. Installations of equipment using these various means of cooling have been made in numerous locations and they are now being evaluated.

Improvements in projectors include opening of the systems for the faster F:2.0 and F:1.9 objective lenses and increased shutter transmission.

Arclamps, Carbons Improved

Improvements in carbon arclamp houses include better auxiliary magnetic control of the arc flame, arc positioning devices, improved ventilation and, in the case of mirror type lamps, faster, more accurate mirrors. New objective lenses with speeds to F:1.9-inch focal lengths from 5 to 7 inches have been marketed.

Carbon trims of higher intrinsic brilliancy for operation up to 180 amperes and designed for the faster optics and greater heat tolerance are being introduced. The total improvements will allow for double the screen light of that formerly used in many cases. A portable device for measuring radiant energy at the projector aperture was described.

Considerable work has been done by the Research Council, Inc., Eastman Kodak Co., National Carbon Co. and others toward the dissemination of information which will provide better co-ordination between set lighting, auditorium illumination and projection light.

Projection optical train alignment devices have been placed on the market by a number of carbon arclamp manufac-

† J. Soc. Met. Pict. & Tv. Eng., May, 1950.

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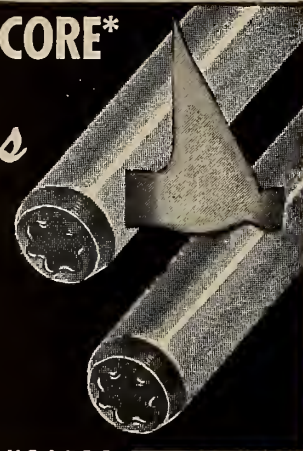
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ton and fibre glass have been placed on the market. The makers claim greater reflectivity without distortion due to sound absorption.

A new light source developed by the Western Union Co. is an open arc between zirconium cored nickel electrodes. This arc has electrical characteristics and other features similar to the low-intensity carbon arc. Long electrode life is a stated advantage.

Widespread Television Advances

Probably the most radical step in the changing scene in television production was the purchase of Vitagraph studio property in Hollywood by American Broadcasting Co. These stages upon which some of the most famous motion picture stars performed before the cameras, now give ABC Television Center facilities for operations comparatively unhindered in contrast to cramped quarters of the radio broadcast studio. The site covers 23 acres and is said to contain the world's largest television sound stage.

The facilities include process projection, permanent sets and some of the other devices at least temporarily adapted from motion picture studio production techniques. Additional freedom in set lighting is appreciated by the motion picture cinematographers who are finding a place in the new medium.

The Navy is studying the effectiveness of Tv as a medium of mass training. Several experimental telecasts to classes assembled at Naval Stations have already taken place.

Predominant Role of Films

During the past year the use of film programs on Tv expanded in volume and improved in tone quality. Several pro-

2 Billion Technicolor Footage

Production of Technicolor footage annually has now passed the 2 billion mark. Run through a projector at the rate of 90 feet per minute, this footage would require, in the aggregate, 42 years of running time. Output of Technicolor reached the 1 billion mark early in 1946; thus the 2 billion mark was attained in slightly more than 4 years.

Illustrative of the popularity of color film (not forgetting Cinecolor, Magnacolor, etc.) is the 1949 production of positive prints—267½ million feet—and that of the year 1932—5½ million feet. Within 17 years Technicolor footage has increased more than 48-fold.

Consumers have been advised of a reduction of the base price of 35-mm Technicolor theatrical release prints. Reductions amount to ½ cent per foot on nitrate stock, and 0.65 cent per foot on safety base (acetate) stock. New base prices are: 5.72 cents per foot on nitrate and 5.95 on safety film, effective as of May 1, 1950.

duction companies are regularly supplying program material as well as commercials for Tv usage that are specially prepared from script writing through laboratory processing of the composite prints. Efforts of this sort have led to the development of production techniques using several cameras operating simultaneously on a single scene and have permitted very rapid and relatively inexpensive production as well as dramatic techniques impossible in a Tv studio.

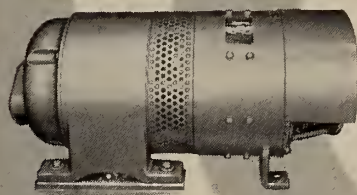
Some experiments have been conducted with a view to filming live Tv programs in the studio simultaneously with the

over-the-air action, or during dress rehearsal. This might lead to the use of such films in place of video recordings.

In Tv studios background process projection is becoming more prevalent. The Holmes Projector Co. has developed a new machine for this purpose with a high-efficiency shutter cycle.

Video Recording Quality

The over-all quality of video recordings has improved considerably. More stable operations resulting from larger volume of recordings and improved original picture material are chiefly responsible. Specialized control devices for the record-



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This latest Hertner development provides an unexcelled power supply for the new type National Excelite 55,000 lamps for drive-in and large theatres at extremely low operating cost.

The "HS" Transverter, equipped with a 20 H.P. motor operating at safe, slow speed of 1750 R.P.M., incorporates all of the outstanding characteristics of other Hertner Transverter models, as well as a new power conversion application for the new type lamps and carbons. The 75-volt generator is extremely economical for operating carbons at 50 to 63 volts. This Transverter also incorporates sufficient amperage output rating for 115 amperes with an ample capacity for 230 ampere changeover—o rating somewhat higher than the original 90 ampere rating for 8 and 9 mm. carbons. This additional capacity gives the "HS" Transverter a greater range of flexibility.

The entire power supply equipment for the new lamp consists of the "HS" Transverter, control panel type "G" and the new "HSD" ballast rheostat. Write for Bulletin No. 301-A.

... with Dual Projection Arc Rheostat

The 5 to 51 volt range of this new "HSD" dual-ballast rheostat with 65 to 100 ampere rating is designed to cover the entire range through 9 and 10 positive carbons for the new lamp, as well as making the "HSD" rheostat adaptable for various other Transverter and carbon applications.



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ing operation and better liaison with motion picture laboratories rather than radical departure from previous methods have been the rule.

The widespread use of the Type 5820 image orthicon tube in the studio has provided better original material for the recordings, which appears to be a very large factor in the results obtained. Reviews of video recordings have led to more emphasis on studio lighting, which in turn has led to better recordings.

Producers' Service Co. has developed a 16-mm camera for video recording. This is of the mechanical-shutter type. Preliminary experiments are being conducted in the recording of color Tv. Up

to the present extremely large aperture lenses have been required.

The increased use of 16-mm sound recording by the Tv industry and the desire for improved sound quality have resulted in RCA's modification of 35-to-16-mm sound reduction printers for various domestic laboratories. The modified printers have lower flutter, double speed of operation and, in general, improved performance.

Status of Theater Television

Considerable progress was made in 1949 toward establishing theater Tv as a regular commercial service. However, one of the major problems, that of program distribution, remains unsettled. The cost of high-quality programming makes it desirable to link many theaters so that all can show the same program simultaneously and the cost per theater will be low.

Two means of linkage are under consideration: (1) use a licensed common carrier now operating video distribution facilities, or (2) set up privately owned facilities. Because current carrier facilities are limited and rates are high, theater owners have been investigating the latter possibility.

Twentieth Century-Fox and Paramount have experimented with micro-wave relays for linking theaters operating on experimental licenses granted by the FCC. Because of numerous requests from theaters for commercial licenses, the FCC requested that 20th-Fox, Paramount, and the Society of Motion Picture Engineers prepare answers to a series of specific questions relating to specifications and spectrum required for a nation-wide, competitive, series of theater Tv networks.


Exclusive Theater Frequencies

Along with the data submitted in answer to these questions, each group petitioned the FCC to hold public hearings on the allocation of frequencies for the sole use of theaters for program distribution. The Theatre Owners of America, Motion Picture Association of America, and many independent theater circuits submitted similar petitions. Other urgent

business before the FCC has held up such a hearing but it is expected shortly.

20th-Fox completely engineered a network of 24 theaters in a 400 sq. mi. area around Los Angeles, including program originating facilities and micro-wave distribution facilities. They have indicated that such a network could be in operation in a year after commercial licenses were granted.

The first production-type theater Tv equipment was sold in 1949. While RCA had already delivered a number of equipments to 20th-Fox, Warner Brothers and the Army Signal Corps, these were intended primarily for experimental use in evaluating and developing this new medium. During 1949, however, the first production RCA direct projection model was sold to Fabian Theatres Corp., for installation in the Fox Theatre in Brooklyn. A second unit was sold to American Theatres Corp., and installed in their Pilgrim Theatre in Boston. Paramount has a permanent installation of their "Intermediate Film" equipment in the Paramount Theatre in New York, and this year in-



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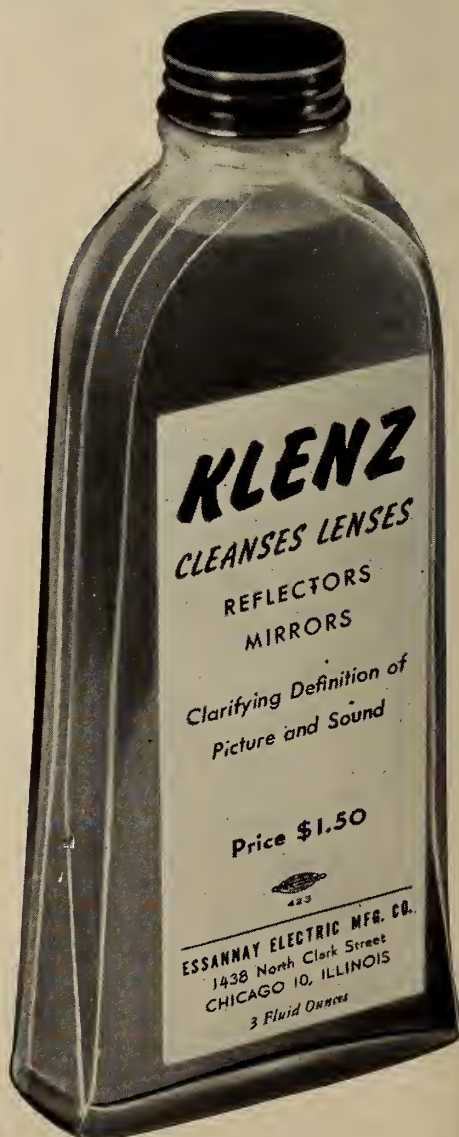
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stalled an equipment in their Chicago Theatre in Chicago.

Compact Theater Tv Equipment

Early in April, RCA first publicly demonstrated its new model direct projection equipment before the SMPE convention. In this unit, the optical elements were reduced from the 500-lb. 42-inch spherical mirror and 21-inch glass corrector lens used in the early equipments to a 50-lb, 20-inch mirror and 15½-inch moulded plastic lens. The optical barrel, or projector, was separated from the control equipment so it could be installed in the auditorium at the correct projection distance from the screen, and the controls could go in the projection room.

In June, this equipment was installed at Fabian's Fox Theatre in Brooklyn to bring the Walcott-Charles heavyweight championship fight to an overflow crowd of spectators almost 1000 miles from the scene of the event. The fight was simultaneously shown at the Paramount Theatre using their "Intermediate-Film" equipment.

Both RCA and Paramount demonstrated their equipments to the Theatre Owners of America at their convention in Hollywood in September. Paramount's

match was staged in a broadcast studio specifically for a theater-type audience at a remote location.

Paying-Audience Tests

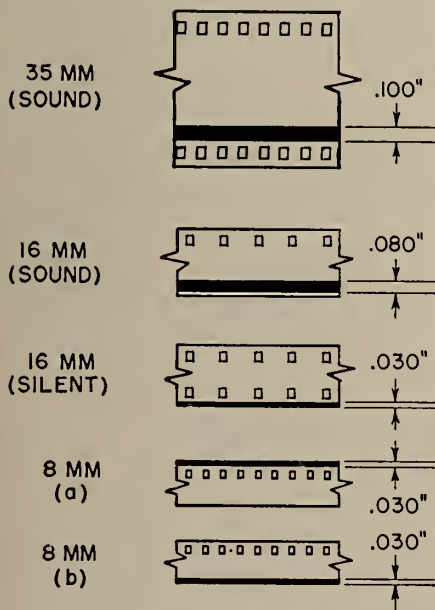
The 1949 Baseball World Series was shown to paying audiences in the Fox Theatre, Brooklyn; the Pilgrim Theatre, Boston, and the West Side Theatre, Scranton, by means of direct projection equipment. It was also shown in the State-Lake Theatre in Chicago by means of film recorded on Paramount's equipment in the Chicago Theatre across the street. Two Milwaukee theaters showed the Series on 7 x 9 foot screens set up on their stages, using smaller direct projection equipment.

The Pilgrim Theatre, Boston, showed

a series of three Notre Dame football games. The final game of the series was also shown in the Fox Theatre, Brooklyn.

The Fox Theatre, Brooklyn, worked with the Board of Education in a public service experiment. On a week-day morning they opened their doors free to New York high school students and their teachers, who witnessed a morning session of the United Nations.

In addition to the intermediate film storage method and the instantaneous method of Tv projection, the Swiss Eidophor system, which uses an auxiliary light source and is still in the development stage, offers a means of providing adequate screen illumination for large theaters.



Graphic evidence of the tremendous upsurge of magnetic recording is this chart showing the relative sizes and positions of magnetic soundtracks on motion picture film, including the exceedingly difficult 8-mm size.

equipment featured a new high-speed drier which reduced the time between photography and projection to 20 seconds.

At the TESMA convention in Chicago, RCA demonstrated its equipment to 2500 theater exhibitors and equipment manufacturers. The demonstration featured a professional middleweight fight staged in the NBC studios and sent by direct line to the projection equipment at the Stevens Hotel. This is the first time an official

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FIG. 5. Sample of film in the fourth stage of decomposition.



FIG. 6. Sample of film in the fifth stage of decomposition.

from the burning of large amounts of film creates a strong updraft which may bear fragments of burning film considerable distances to endanger neighboring properties.

Safeguarding Disposal Personnel

The rapid production of gases by burning film makes it extremely dangerous, particularly if burned in a furnace or confined space. During test fires in a well-vented vault, engineers have recorded pressures as high as 18 pounds per square inch. It is readily understandable that no ordinary furnace could withstand this pressure: its breaching

would fail and fill the furnace room with flames and poisonous gases.

It is quite possible in the initial inspection that a relatively high proportion of film in advanced stages of decomposition may be found. The opening of cans containing this film may liberate quantities of noxious gases into the working area. Personnel exposed to them may experience nausea, headache, and other unpleasant symptoms if the ventilation is inadequate. It is therefore recommended that the personnel working on old film inspection be given ten-minute rest periods each hour in the open air.

If we are to enjoy freedom from film fires during the coming summer, a comprehensive program of film inspection should begin now so that the task may be completed before the onset of hot weather. Since film is constantly subjected to decomposition, inspection should be repeated annually, preferably in the Spring.

Only by such procedure can we avoid the insidious menace to life and property hidden in deteriorating motion picture film. Particular attention should be given to film of unknown quality or of obscure origin.

BOOK REVIEWS

16-MM. SOUND MOTION PICTURES, by William H. Offenhauser, Jr., 580 pages, profusely illustrated, appendices, subject index, bibliography. Red leather cloth. Interscience Publishers, 215 Fourth Ave., N. Y. Price: \$10.

As the author states, "the 16-mm. film has become something more than a mere designation of a film width; it is now symbolic of all non-theatrical film." Therein lies the supreme importance of this admirable, and in most respects most important, contribution to what formerly was termed the "sub-standard" film gauge. Here is no dust-dry compendium of historical and other data, but a straightforward and extremely comprehensive presentation dealing with all phases of the art; it shows what is necessary to produce and reproduce 16-mm. films on a plane of the highest technical quality.

The author has had extensive experience in the 16-mm. field, with producers, distributors and exhibitors, and for an extended period of time he was associated with Columbia Broadcasting System. He is eminently qualified for the task he set himself, and no higher praise can be accorded than to

state that he accomplished precisely what he set out to do.

There can be no question but that this book is the standard, definitive work on the technical aspects of 16-mm. sound film, and it reflects great credit on all who engaged in its production.

RADIO OPERATORS' LICENSE Q&A MANUAL, By Milton Kaufman. 608 pages, profusely illustrated, index and appendices. Blue cloth binding. John F. Rider, Inc., 480 Canal St., N. Y. Price: \$6.

The title of this volume is somewhat misleading in that it would seem to stress its worth to the beginner in the radio field. Such is far from the truth, for it is difficult to imagine how anybody who is seriously interested in any technical phase of the art could possibly be without this book. Amateur radio (all classes) radiotelephone, radiotelegraph—this painstakingly complete book covers the field in fine fashion.

Systematically listed herein are the questions and answers to past FCC exams, plus a follow-through discussion to the answer, so necessary for a complete understanding of the technical question. Abundant illustrations make difficult technical questions crystal-clear. The author, Milton Kaufman, an instructor at RCA Institutes, writes with the authority born of years of experience and lecturing on this subject.

This is by no means an *optional* text but an indispensable reference volume for both students and operators. All radio enthusiasts will find themselves constantly referring to this complete, comprehensive handbook.

RCA Magnetic Recorder Ready

RCA's new magnetic recording system, first demonstrated at the last SMPTE Convention, is now available to motion picture producers. The system includes a new magnetic record-reproducer, mixer amplifier, recording amplifier assembly, and power supply, and surpasses standards set by the Motion Picture Research Council. Both 16- and 35-mm. systems are available, either in portable carrying cases for location work or as rack-mounted equipment for studio use.

New economies in film production are made possible by this new RCA equipment, since magnetic film may be reused many times and no processing is required. The system also permits quality reproduction with less complicated equipment than is now generally required.



What is so right about this picture?

Is it THAT Dad's finally retired . . . the old alarm clock gagged for good?

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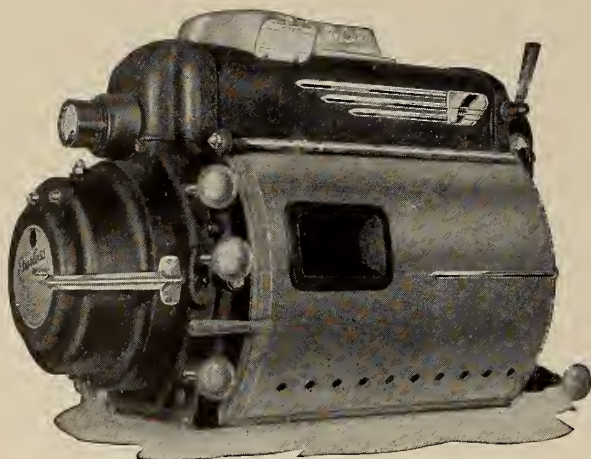
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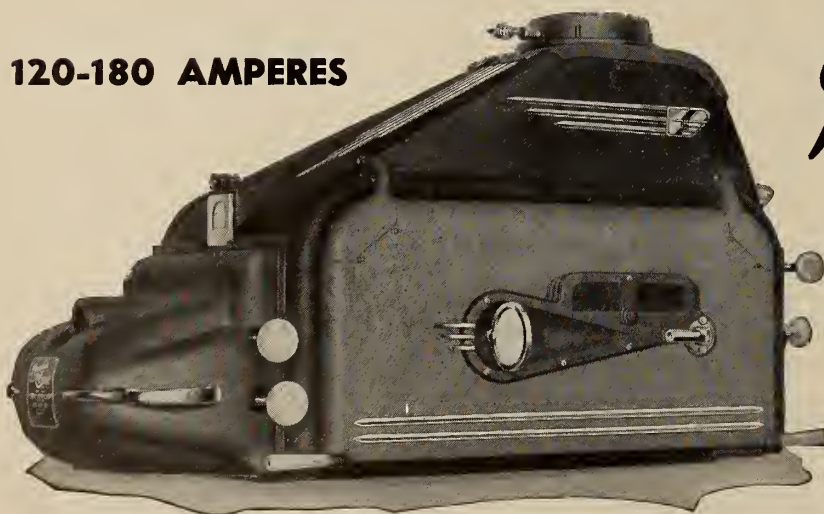
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HENRY B. SELLWOOD, *Editor*

Volume 25

SEPTEMBER 1950

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MONTHLY CHAT

PUBLICATION of the first list of materials and supplies the distribution of which will be under rigid government control will likely set in motion another wave of "scare buying," a genteel name for hoarding. Such hoarding will serve only to aggravate a situation which up to the present time contains no threat of serious dislocation of the operation of motion picture theaters.

It appears that the only phase of industry operation that will be severely restricted will be the building of new theaters, but this eventuality might prove to be a blessing in disguise. In any event, the post-war rush of new theater building, including drive-ins, has long since passed its peak.

Inquiries by IP disclose that there exists an ample supply of equipment and supplies to keep all theater projection rooms operating. True, the manufacturers of lamps and projectors, for example, have a backlog of orders which have thus far resisted energetic efforts to whittle them down. Few theaters, however, will run such units of equipment to the point where replacements must be made within the space of a few days, or even weeks.

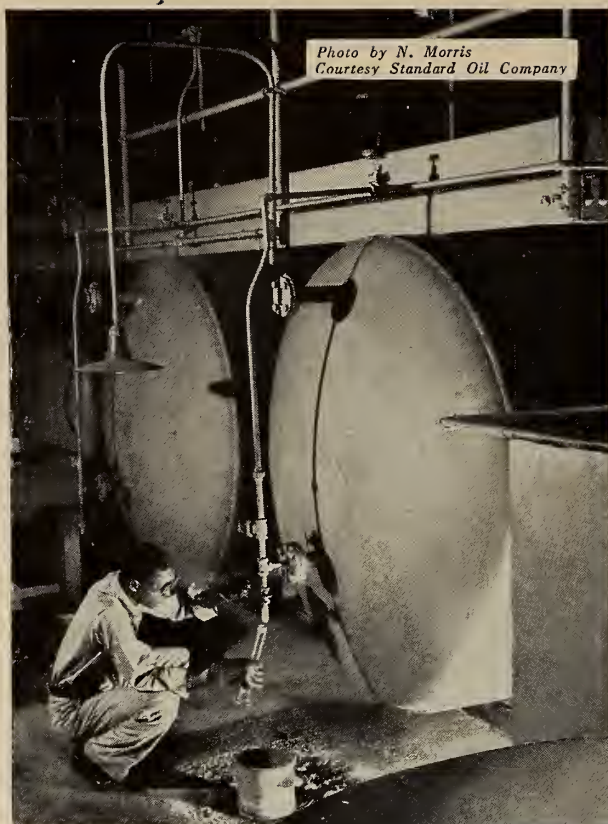
Many projectionists seem to feel that the real pinch will be felt in a shortage of carbons. Shortly after the Korean trouble developed there was a rush of carbon-buying which occasioned the imposition of rather stiff restrictions by the manufacturers to the end that all theaters would get their rightful share. Even now all carbon orders which reflect a sharp upturn over the normal quotas are "written down" to a reasonable level. This policy will be continued in effect. IP is assured that if the field cooperates by buying only normal quotas there will be a sufficiency of carbons for all theaters.

The theater field is fortunate in having as its representative on the government control board Nat Golden, whose long years of experience ranging from projectionist (Cleveland IA Local 160) to the broader aspects of the U. S. Dept. of Commerce in both the domestic and foreign fields are an assurance that the best interests of the industry will be served.

Projectionists can render the industry and their craft a great service by exerting every pressure to discourage "scare buying." Cooperative effort all along the line will keep the wheels turning normally.

In "Monthly Chat" for last month (August) Line 8 in Paragraph 3 should have read: "culprit. Eastman Kodak insists that careful inspection on its end makes it impossible for any film footage to be shipped out without proper markings."

The distinction between the words "with" and "without" is so obvious as to require no further words here anent a red face.



THE STRONGEST ACID

Sulphuric acid is considered the strongest of acids. It has a dehydrating action on carbonaceous materials and is capable of attaining a higher concentration than any other acid. The manufacture of sulphuric acid is one of the important chemical industries because the use of this acid is necessary in preparing almost all other chemical products.

In terms of oxidizing value, the strongest acid is nitric acid, one of the earliest known and most valuable mineral acids, usually prepared by adding sulphuric acid to sodium nitrate and distilling off the nitric acid that is formed. It is also produced commercially from ammonia gas and, where electric power is extremely cheap, by passing air through a powerful flaming electric arc.

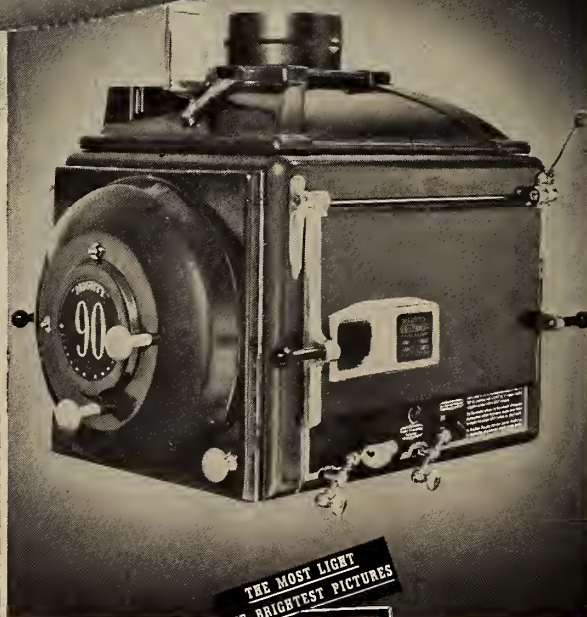
In terms of ionization, the strongest acid is hydrochloric acid, a colorless solution of hydrogen chloride gas in water. It is interesting to note that the perfectly dry gas is not acid and does not attack metals.

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THE BRIGHTEST PICTURES
On the
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Minimizing Flicker in Projection

By ROBERT A. MITCHELL

UNTIRING efforts have been applied to the problem of flicker in motion pictures. Although notable progress has been made, and certain types of flicker have been so greatly minimized as to be practically non-existent, *shutter flicker* still is unfortunately part and parcel of the standard projection process.

Because the action of the projection shutter is very rapid (48 light pulsations per second; 72 pulses in special projectors) shutter flicker is not usually noticeable except when the picture is extremely bright. And because it is perfectly *periodic*, the observer of a motion picture gradually becomes accustomed to it and mentally ignores it except *under certain conditions*.

Anybody observing for the first time a "white screen" illuminated by a running projector is astonished by the violent flickering produced by the rotating shutter. When film is in the machine, however, the flickering is hardly discernible except in extremely bright scenes: the screen *appears* to be continuously illuminated because the brightness has been considerably reduced. The illumination is actually pulsating as before, so we seek an explanation in that much discussed psycho-physiological phenomenon known as "persistence of vision."

'Persistence of Vision'

Persistence of vision is that property of the eye (or optical center of the brain) whereby faint luminous stimuli persist in the consciousness for a fraction of a second after such stimuli have actually vanished. Intense luminous stimuli, however, persist as if they were much fainter

than they really are—the eye (or brain) cannot absorb and "hold over" the full intensity of light.

And there is empirical evidence that excessively bright illumination actually reduces the normal persistence of vision for as long a time as 4 or 5 minutes. When persistence has been reduced, the eye fails to carry over the flashes of screen illumination through their intervening periods of darkness. Result: the picture flickers, and moving objects in it appear to move by rapid jerks, instead of smoothly.

It may therefore be stated as a definite and unailing rule that the brighter the picture, the more annoying the shutter flicker.

Persistence of vision is by no means constant, hence arbitrary statements of its duration are all misleading. It is different for different individuals, and it varies from time to time even in the same individual. A person not accustomed to viewing motion pictures is likely to find shutter flicker more noticeable than a regular moviegoer does. Nervous stimulation reduces persistence of vision, hence a picture seems to flicker more during exciting or highly emotional scenes than during monotonous ones, if both are equally illuminated.

Drugs affect persistence of vision, too—alcohol increases it, while caffeine (coffee, tea, Coca-Cola) and pressor drugs (ephedrine, amphetamine, hay-fever remedies) reduce it.

Constantly illuminated objects in the vicinity of the screen increase apparent shutter flicker by contrast. Such objects include exit lights and decorative stage lighting used while pictures are being shown. Illuminated screen surrounds are, of course, fatal to a perfect picture illusion: they not only make shutter flicker worse but they detract from the dramatic power of the picture. The auditorium, and especially the stage and screen masking, should be as dark as possible during projection. Distraction is minimized by employing standard *rounded* corners for the picture instead of the customary sharp, square corners.

The sky area of an outdoor movie appears to flicker because it is ordinarily brighter than other picture areas. Increased illumination reduces persistence; and, amazingly, previous exposure of the observer to bright light frequently causes a sustained reduction of persistence. If one enters a theater during a matinee performance directly from the bright sunlight, the picture may seem to flicker violently for as long as five minutes!

Closely connected with persistence of vision is the illusion of motion created by a chronological sequence of rapidly succeeding "still" pictures. Contrary to popular opinion, persistence of vision is not responsible for the illusion of motion, but only assists it.

'Persistence of Visualization'

The appearance of motion is due, rather, to a "persistence of visualization," a characteristic of the mind which requires the observer to accept, subconsciously, each frame of the film as the

logical outcome of the conditions presented by the preceding frame. The mind does not know what will happen on the screen, but it is intuitively aware of several "logical" possibilities. In other words, the mind has, as its chief property, an unalterable concept of cause-and-effect which forces it to connect up the individual frames into a more or less smooth continuum of motion.

"The picture on the screen," the mind insists, "is not stationary because effects are seen to follow their causes, as in ordinary experience; hence the picture is obviously in motion."

This explanation is not as far-fetched as it might seem. "Conscious perception" is absolutely subject to the orderly passage of time, the continuous slipping of the future into the past. That which is the result of that which was; that which will be is the inevitable outcome of that which is. Is any other pattern of existence, of casual relationships, conceivable?

Succession of Events in Time

Nor need we flatter ourselves that the ability to see motion in the movies is a distinctly human attainment. Because all minds are inescapably attuned to the *succession of events in time*, even very young children, unintelligent persons, and animals interpret a cinematic sequence as true motion. Tests with animals prove that this is absolutely true. But whether such animals as cats and dogs possess sufficient persistence of vision to eradicate from conscious perception the periods of darkness caused by the shutter of the projector is not known. Perhaps we shall never know.

Persistence of vision, we may conclude, helps the eye to "carryover" one frame to its successor through the interval of darkness and thus minimizes the annoying flicker which detracts from the life-likeness of the movies. "Persistence of visualization," the universal intuition of cause producing effect, creates the illusion of motion by integrating the rapidly succeeding frames into a continuous whole, *whether the picture flickers badly or not.*

Moving Optical Compensator

Projector designers have long dreamed of eliminating shutter flicker by substituting for shutter and intermittent movement a moving optical compensator. Several noteworthy attempts at "optically continuous" projection have been made, but all of these have only academic interest. It is entirely possible that a really workable system of continuous projection will some day appear and revolutionize the projection art. The Mechau system *almost* did so.

Max Skladanowsky's curious double-film projection system developed in 1895*

* IP for March, 1950, p. 8.

must be mentioned as the first example of flickerless movies. Standard single-film continuous projectors have been built by Mechau, Vig, Holman, and Comes.

The complicated optics of the Leitz Mechau sound-on-film projector, and the great difficulty of repairing or replacing the rotating and vibrating mirrors, led to its abandonment by the few theaters which tried it. The only Mechau installation in the United States was in the Capitol Theater, New York, about 25 years ago. The machine was used for showing newsreels and novelty shorts.†

Speeding Up the Shutter

Every projectionist knows that the greater the speed of a projector, the less visible is the flicker produced by the rotating shutter. The increase of standard film speed from 16 to 24 frames per second when sound pictures were introduced effected a slight reduction of shutter flicker by stepping up the frequency of the light pulses from 32 to 48 per second. A further increase in the rate of film travel would have both advantages and disadvantages, but it seems doubtful at present that this expedient would be given serious consideration by studios and theaters.

Is there any way to speed up the shutter without speeding up the film? Substitution of 5-to-1 intermittent movements for the 3-to-1 movements now used would permit this to be done. Instead of the customary 2-bladed shutters, 3-bladed shutters giving 72 light pulses per second could be used with only negligible loss of light.

† For information on the Mechau, see "Continuous Projection by Optical Compensation," by H. A. Robiczek; IP for March 1932, p. 14.



No "picture-frame" effect by means of the elimination of masking and the absence of the conventional proscenium opening is shown here, the contribution of Ben Schlanger, the modern-minded architect. Convergence of the forward side walls, only a little wider than the screen itself, positions the screen image in a "natural" field of self-created light.

There are factors involved in the action of the rotating shutter which, in certain cases, make it possible for the projectionist to reduce the prominence of shutter flicker. First of all, the width of the cutoff and balancing blades of 2-bladed shutters must be the same. If one blade is narrower or wider than the other, an annoying 24-cycle flicker will be introduced; and the greater the difference in the included angles of each of the two blades, the more violent the 24-cycle flicker.

Second, the pulsations of light produced by the shutter must be *absolutely* periodic—the slightest irregularities giving rise to fits of strong flickering. "Hunting" of the shutter comes about primarily through backlash in the gear train which drives the shutter shaft. The shutter should accordingly be tested for backlash from time to time, and all worn gears immediately replaced.

Third, a-c ripple in the d-c supplied to the arc combines with the frequency of the shutter to give "beat frequencies" which, if greater than 4 or less than 40 cycles per second, produce strong flicker. Sixty-cycle fluctuations in the light source are the most troublesome, since 12-cycle beats are produced when the shutter frequency is standard. Fifty-cycle variations, on the other hand, are seldom bothersome, since the beat frequency (2 cycles) is too low to be visible unless very pronounced.

Detecting Light Fluctuations

The detection of fluctuations in the light of the arclamp calls for ingenuity on the part of the projectionist. The following is a good test.

Remove the photocell cover in the soundhead so as to expose the cell, and switch the sound system on. Strike the arc and open the door of the lamphouse. (Wear dark glasses!) Turn off the projection room illumination.

By means of a pocket mirror held several feet away from the lamphouse, direct a little of the arc illumination into the photocell compartment. Listen carefully for a 60- or 120-cycle hum. A hum of these frequencies is often heard when arc power is drawn from rectifiers.

When motor-generators sets are used, only a high-pitched commutator squeal will be heard, as a rule. High-frequency fluctuations of the arc illumination do not produce visible beats in the picture brightness, thus do not impair picture quality in any way.

Whenever strong 60-cycle variations in arc illumination are detected, advice should be requested from the manufacturer of the rectifier or motor-generator set. A defective dry-disc unit or Tungar bulb of a rectifier may be responsible. In any case, special choke coils—rather

(Continued on page 30)



She keeps the romance running smoothly...

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W. U.'s 'Telcoarc':

A Concentrated,

Open-Air Arc

By W. D. BUCKINGHAM

Electronics Research Division
Western Union Telegraph Company

THE Western Union "Telcoarc" is a new type of arc lamp which uses zirconium electrodes instead of carbon electrodes as in the conventional carbon arc.* Zirconium electrodes have the advantage of unusually long life. The electrodes in a 1 kw. "Telcoarc," for example, burn away at a rate of only 0.04 inch an hour, or one inch of electrode for 25 hours of operation.

These electrodes are made by packing a zirconium metal powder mixture under high pressure into a thin-walled nickel tube which has an outside diameter of $\frac{1}{4}$ inch. After packing, the electrodes are heated to a bright red heat which sinters the powder into a solid core of zirconium within the nickel tube.

Formation of the Arc

In use, two of these zirconium-cored nickel rods are connected to a source of alternating current and their ends are brought together. When they are drawn apart slightly, an arc is struck between them and a bright spot of light about $\frac{1}{4}$ inch in diameter is formed on the end of each electrode. This spot is actually a microscopically-thin pool of molten zirconium metal and zirconium vapor

maintained at a temperature of more than 6000 degrees F. by the heat of the arc. Its average brightness is 130 candles per square mm., which is about the same as that of the low-intensity carbon arc.

The arc stream is comparatively non-luminous, the majority of the light being emitted by the incandescent zirconium pools.

During the first seconds of operation of a pair of new electrodes, the zirconium metal at the tip is burned to zirconium oxide. The hot oxide is a good conductor of electricity so the arc continues to strike to it. The outermost layer of the oxide, at the point where the arc stream terminates, is then reconverted to zirconium metal by the action of the arc.

Constant Chemical, Physical Change

The particles of the material in the resulting pool of molten zirconium undergo a constant cycle of chemical and physical change. They are converted from zirconium metal to zirconium vapor to zirconium oxide and back again to the metal, the vapor and the oxide, cycle after cycle. It is this unique action of the electrode material, in which the zirconium is continually oxidized and reduced, using its own ashes to produce new material over and over again, that is responsible for the long life of the Telcoarc electrodes.

The greater part of the material in the vapor stage is ionized and drawn back to the electrode. A small portion, however, escapes from the reaction region and is lost. If it were not for this loss of material, the electrodes would never need replacement.

After a pair of electrodes have been used, their active ends are covered with a cap of zirconium oxide which, when cold, is an electrical insulator. It is necessary to touch the ends of the electrodes together and apply a momentary pulse of high voltage to start the arc. The high voltage forces a current through the oxide which heats it to its conducting and operating temperature in a fraction of a second.

It is convenient for many applications to mount the two electrodes at right

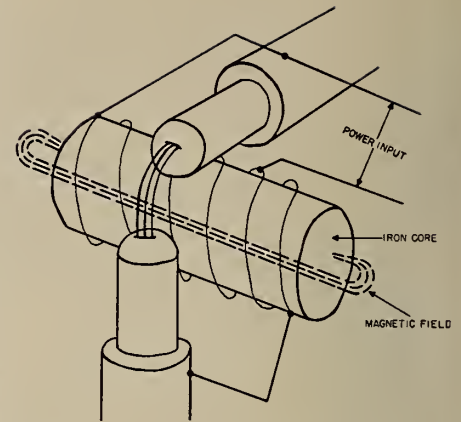


FIG. 1. Differential magnetic arc control system for W. U. Telcoarc.

angles to each other. This allows the light from the electrode to fall unobstructed on the light collecting mirror or lens. The stability of the arc in such a mounting can be improved by a differentially-wound electromagnet as shown in Fig 1. One winding of the coil is connected so that it is in series with the electrodes. Thus, its magnetic effect is proportional to the current being drawn. It is poled so that the resulting magnetic field forces the arc stream away from the magnet.

The second winding on the same iron core is connected across the two electrodes so that its field is proportional to the voltage across the arc, and it is poled to draw the arc stream in toward the magnet.

Constant Automatic Control

In operation, the field of one coil tends to neutralize that of the other as long as the arc stream is in the correct position. If the arc tends to shorten, the voltage coil is weakened, the current coil is strengthened, and the arc is forced out to a longer path. When the arc tends to become too long, the opposite action takes place and the arc stream is pulled back to its proper position. Thus, the position of the arc stream is under constant automatic control.

A small permanent magnet placed near the arc so that its magnetic field is at right angles to that of the electromagnet, gives the arc lateral stability.

A simple hand-fed Telcoarc unit with its power supply is shown in Fig. 2. The circuit diagram is shown in Fig. 3. The transformer is of a type having high magnetic leakage, as is usual for arclamp transformers. The starting sequence is as follows: the tips of the two electrodes are brought together by pressing forward on the knob at the bottom end of the vertical electrode feed screw. The electrode holder assembly is pivoted for this purpose. The "start" switch in the power unit is then depressed; this applies

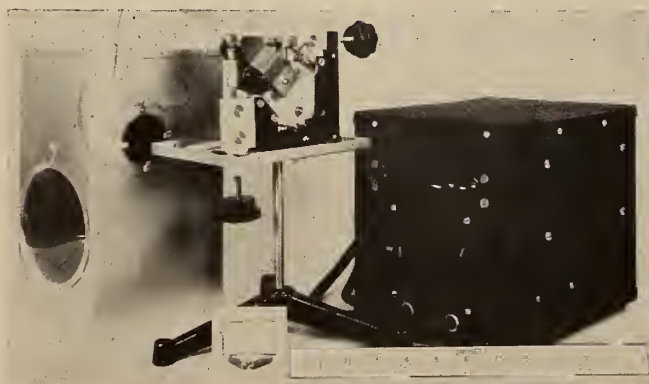


FIG. 2
A simple hand-fed
Telcoarc unit
with its power
supply.

* "An Improved Concentrated-Arc Light"; IP for October, 1949, p. 10.

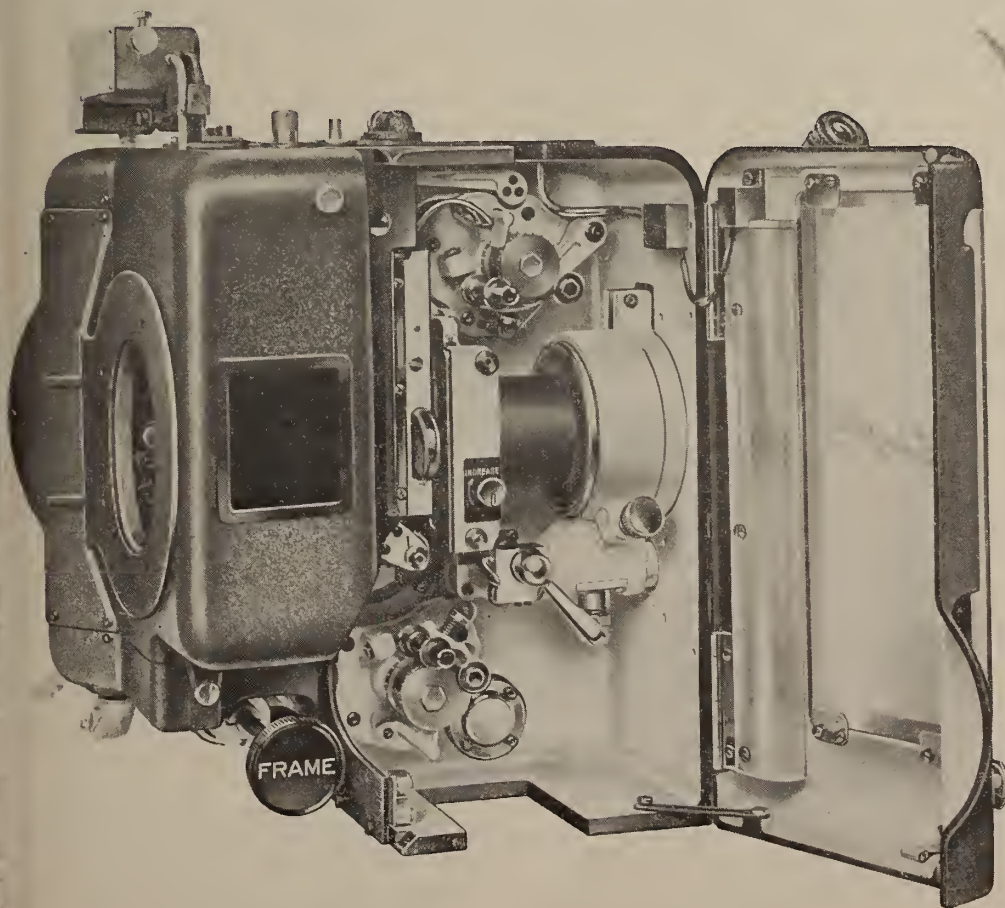
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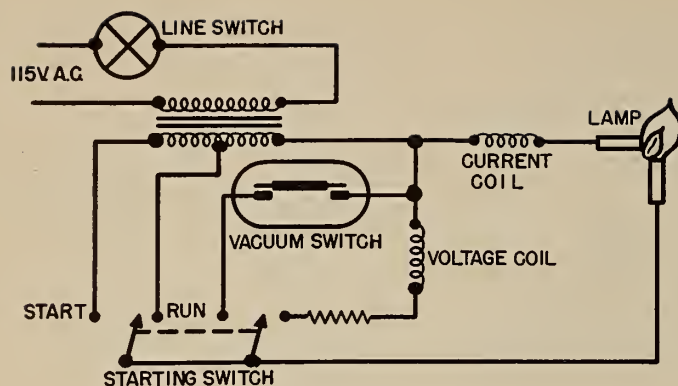


FIGURE 3
Transformer-type
of power supply
for W. U. open-arc
zirconium Telcoarc.

about 300 volts to the electrodes and the vacuum switch.

As the vacuum switch is normally closed, it draws a current of about 5 amperes from the transformer and causes a strong magnetic leakage field around the transformer. The vacuum switch is mounted close to the transformer so that its contacts are caused to open by the magnetic field. The resulting quick break of the current by the contacts in the highly-evacuated switch generates an inductive pulse of several thousand volts across the electrodes.

The arc then strikes, the start switch is put in the "run" position where the arc supply voltage is reduced to 90 volts, and the electrode is allowed to drop back to give the regular length of arc gap. Normal operation of the 1 kw. Telcoarc is at 18 amperes with 55 volts across the arc.

Little Adjustment; Electrode Life

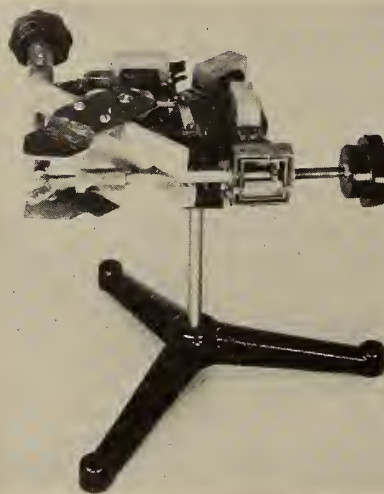
Once started the Telcoarc will usually burn for a period ranging from 15 minutes to 1½ hours without further attention or adjustment. The length of time that may elapse between trims depends upon the length of the gap between the electrodes at the start of the period, the arc current and the open circuit voltage of the power supply transformer. Shorter gaps, lower currents and higher voltages tend to extend the intervals between adjustments.

The total life that can be obtained from an electrode depends upon its length and the current at which it is operated. The ¼ inch diameter electrodes now being manufactured are made with a zirconium core which is about ¼ inch long. They last for 6 or 7 hours when burning at 1 kw., and for 24 hours when operated at 600 watts. Longer electrodes which will give a much longer life can be made if a need for them is developed.

The hand-fed Telcoarc is useful in the many applications where it can be given the occasional trimming which it requires. Many applications, however, call for a lamp which when once started will need no further attention. The automatic Telcoarc shown in Fig. 4 is being de-

veloped for such uses. The electrodes are arranged so that their tips are brought together by an electromagnet.

FIG. 4. 1 Kw. Telcoarc with automatic controls.



When the "start" switch is operated and the arc established, the electrodes draw apart to the correct spacing. The

proper arc gap length is then maintained automatically as the electrodes burn away by simple electromagnetically-operated ratchet and pawl stepper mechanisms which rotate the electrode feed screws. At each operation they turn the electrodes through an arc of 15 degrees and advance them one one-thousandth of an inch. The stepper mechanism is adjusted to operate whenever the voltage across the arc rises above the normal value.

Definite Operating Advantages

With automatic start and feed the Telcoarc will operate for the full life of the electrode without attention. It thus combines the advantages of convenience and ease of operation of the tungsten filament lamp with the small source size and high brightness of the carbon arc. The fumes from the lamp are not poisonous and there is so little smoke that special ventilation is not usually required.

The lamp requires no rectifier, thus the power supply units are comparatively light and compact. The 1 kw. unit can be operated from any ordinary a.c. outlet. These characteristics make the Telcoarc particularly valuable for portable applications.

Experimental lamps have been made which will operate at 2½ kw., and it is expected that they will be produced commercially. These larger lamps should add to the numerous fields of application where W. U. Telcoarcs have already been put to use.

Federal Admissions Tax off \$2 Million

Federal admissions tax collections in June were nearly \$2 million below the total for June of last year, with the aggregate for the first six months of 1950 more than \$6 million off the 1949 total. Pix are believed to account for approximately 76% of the total.

IA-IP Radio Amateur Radio QSO Contest in Full Swing

All indications point to intense competition in the IA-IP radio amateur contest which is scheduled to get underway as these lines go to press. From Monday, Sept. 11, through Friday, Sept. 15, the "ham" frequencies are expected to be jammed with calls from one IA man to another, from coast to coast, and from the Gulf up to and through Canada.

During these five days, inclusive, IA men will be combing the airwaves hither and yon with frantic calls to their brother craftsmen in an effort to register the top score for contacts during the period and thus cop one of the top awards for the most contacts registered. Handsome certificates will be awarded to all who finish within the top-ten bracket.

The alert "ham" will use the official list of brother "hams" as published in IP for August—although it is not necessary that contacts be confined to those

listed thereon. Amos Kanaga, guiding light and overseer of the contest, has announced that he will extend credit to any contact between IA men on the basis of a log sheet showing the Local Union affiliation and the date and time of contact. The exchange of QSL cards among contestants is not necessary; but log sheets dispatched to Amos must be postmarked not later than five days after the contest ends, or on Sept. 16.

Qualifications for entering the contest are simple: one must be an IA member, his log sheet directed to Amos must be postmarked not later than Sept. 16, and the sheet must show the IA Local Union numbers of both contactees. Address Amos Kanaga at 623 Capuchino Drive, Millbrae, Calif.

It is hoped to have the results of the contest tabulated in time for publication in the October issue of IP.

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Uniform Screen Light Distribution; Elliptical Reflector Mirrors

One of the most provocative articles to appear in IP for many a month was that by Dr. Edgar Gretener entitled "The Ventarc H. I. Carbon 'Blown' Arc: A New Concept" (July, 1950, p. 13). Several questions prompted by this article are discussed in the appended summary of opinion, which constitutes a very worthwhile contribution to the literature.

By ROBERT A. MITCHELL

RELATIVE to the Ventarc H. I. Carbon Arc: two new principles are involved in this remarkable lamp, the non-elliptical mirror (didn't I scream my head off for a parabolic mirror many months ago?), and the so-called "blown" H. I. arc. Both are distinct advances in the art. Except for one point—a matter involving psychological elements and perhaps a trace of personal opinion—Dr. Gretener's article is excellent.

I question Dr. Gretener's opinion that "if the screen is illuminated with even and homogeneous intensity from the center right into the corners, the contrast of the black frame surrounding the screen will produce the impression as if the screen were brighter at the boundaries than at the center. The screen will consequently appear similar to a bowl slightly curved and hollow at the center."

90-95% Side-to-Center Distribution

I have investigated this point; and my conclusion was such that I operate low-intensity lamps of the mirror type to give a side-to-center distribution of 90 to 95%. (I am unable to obtain this degree of illumination uniformity with any high-intensity lamp I have ever operated.)

The change from the "standard" 80% to my own standard of 95% side-to-center distribution was definitely a change from a slightly "vignetted" picture to one having the appearance of perfect uniformity of brightness.

I realize that the contrast factor referred to by Dr. Gretener exists, but I also realize that the illusion of increased brightness at the edge of the screen in no case exceeds 5%—yes, 5%—of the actual physical brightness. Dr. Gretener, it seems to me, has greatly exaggerated this psychological effect.

Interesting Corollaries Cited

Neither Dr. Gretener's side of this question nor mine can be proved by mathematical or physical methods, of course. Illusion is involved. But this does not mean that any projectionist

must take somebody's, anybody's word on the matter. There are means by which interested projectionists may test the matter for themselves and thus form their own opinions.

Does the general auditorium lighting of the theater illuminate the screen evenly when the stage curtains are opened to expose the screen? Then open the curtains, turn on the house lights, and examine the screen. *Do or do not the edges of the screen appear brighter than the center?*

Have you ever looked at an unclouded, evenly illuminated sky through a skylight or a small window in a dark room? *Does the evenly illuminated sky appear brighter at the edges of the window?*

Once again I voice the firm opinion that nothing less than 95% side-to-center screen-light distribution is good enough for the paying patron. To make myself appear even more stuffy, I shouldn't tolerate a departure from this standard of more than 2%. (Of course, I seem to be all alone in this, so nobody would bother even if I yelled for 100% distribution.)

With the parabolic mirror any distribution can be obtained from any distribution of luminosity of the positive crater. Dr. Gretener is absolutely correct when he tells us that "total-lumen" ratings are valueless. The craft should be grateful to him for his fine article.

By Dr. EDGAR GRETENER

ANENT Mr. Mitchell's communication anent my article in IP: The "bowl effect" to which I referred was observed during projection tests concerning large lenticulated screens. It proved to

be of importance that not only the sides but also the corners of the screen showed the same luminosity as the center of the screen.

The intensity of illumination may be subject to individual sight variation, and it will likewise depend upon the general circumstances under which the image is viewed: the size of the screen, intensity of illumination, the distance of the observer from the screen, and the properties of the screen surroundings.

Permissible Uniformity Deviations

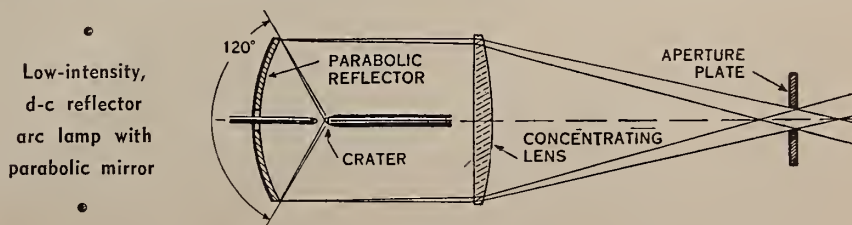
Whether or not the "bowl effect" is visualized as such by an observer is irrelevant. Of importance, however, is the fact that, if the visual impression of a uniformly illuminated plane is to be experienced, it is not necessary to illuminate a screen with effectively uniform intensity right into the extreme corners.

This poses the problem as to what deviations from exact uniformity of illumination are admissible—that is, so that under the practical circumstances of motion picture projection, and with illumination from the projector with no film in the gate, the screen still will appear uniformly illuminated right into the corners.

But the mere expression of the ratio of side-to-center illumination doesn't tell the whole story; two other factors must be considered: the light level of the screen from the corners to the center, and the light level of the screen from the corners-to-the-sides. Let us assume that the "standard" illumination is represented by a corner-to-side ratio of 80%. Under such circumstances, a luminosity ratio of 80% from side-to-center is wholly acceptable.

80% Distribution Held Ample

If, however, we place a value of 100% upon the luminosity level from corners-to-sides, the value of the side-to-center line level may be decreased below 80% without conveying to the vast majority of





METHOD OF IMAGE FORMATION ON THE PRINCIPAL AXIS

In this case the object (C_1) and the image (C_2) are equally distant from the center of the lens, hence they are of the same length, and the distance between them is four times the principal focus of the lens.

viewers the impression of varying light levels for the overall screen surface.

It must be emphasized, however, that a condition of decisive importance for the acceptance of the foregoing statement is that the *color balance* of the entire screen area be maintained.

Generally speaking, it may be said that the absolute maximum of effective screen lumens may be obtained if

(a) the light is of equal color across the entire screen; and

(b) the admissible side-to-center ratio be made as small as possible, which condition, as stated previously, may be obtained under practical circumstances without impairing the visual uniformity of screen illumination *provided* that the corner-to-side ratio can be improved.

Even 60% Level is Acceptable

Our tests showed that given a value of 100% for the corner-to-side ratio, an impression of practically uniform screen illumination is had by the observer when the side-to-center value is 60%.

Based on the aforementioned considerations, it is forcibly evident not only to us but to many other workers in the art that the value of the side-to-center ratio must be supplemented by the value of the appertaining corner-to-side ratio if a proper characterization of uniformity of screen illumination is to be had.

[Further comment on the article by Dr. Gretener, with specific emphasis upon the type of optical system employed, is appended hereto.]

Ventarc Mirror System

FROM Robert Ziller, of Billings, Montana, comes the following communication which is expressive of the thoughts occurring to not a few projectionists who pondered the Ventarc article. In clarification, one of our outstanding, but unsung, practical projectionists with a flair for optics (Sam Glauber of the Paramount Theater staff in N. Y. City) contributes more than his share to the common weal.

"I read the fine article on the new Ventarc, and there is just one thing that bothers me. Is the elliptical reflector as described by Dr. Gretener a new idea? There are reflectors available in this country which were designed to compensate for the fact that the light

source is disc-shaped rather than a point. This stops spherical aberration. Is this the same type of reflector as Dr. Gretener described? If it isn't, I'm still a bit hazy about the principle of the Ventarc reflector."—ROBERT ZILLER.

By SAM GLAUBER

Member, IA Local 306, New York City
Paramount Theater Projection Staff

The elliptical mirror is not a new idea, having been used extensively for projection about 25 years ago. There was also a parabolic mirror on the market at that time, but since this type of mirror was corrected only for parallel rays, a condenser was required to converge the light rays to a "spot" on the aperture. The elliptical mirror did not require the use of condensers and was found to be more efficient than the parabolic. No "true" spherical mirrors were ever utilized for projection because of excessive *spherical aberration*.

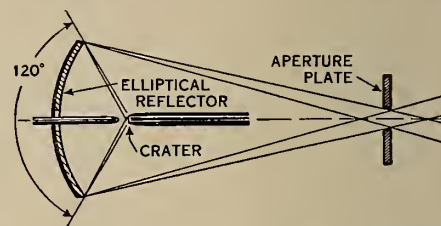
Mr. Ziller apparently believes that if a mirror is designed to "compensate for the fact that the light source is disc-shaped rather than a point" it will "stop"

spherical aberration. I'm afraid that he is laboring under an illusion which is all too common in the projection field.

Mirror Radius Coverage

Spherical aberration is a fault caused principally by the fact that the object (crater) is much closer to the center of the mirror and is progressively farther away from the outer zones of the mirror. (See Figs. 1 and 2 of the Gretener article.) As a result of this condition, the light rays coming from the outer zones of the mirror will converge and come to a focus point much nearer to the mirror than the rays coming from the center portion of the mirror.

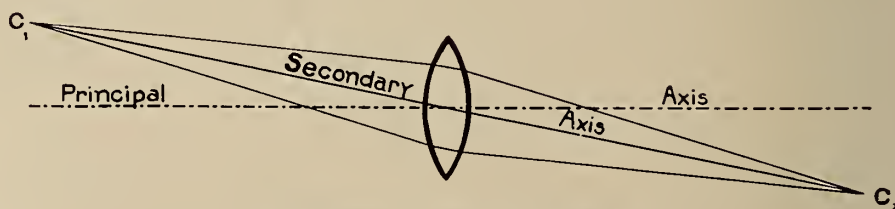
The failure of the light rays coming from the outer and the inner areas of the mirror to meet or cross within a reasonable distance from one another



Low-intensity, d-c arc with elliptical mirror.

makes it impossible for the light beam to be concentrated at one plane—the aperture.

Spherical aberration is progressively increased with an increase of the diameter of the mirror, since the outer zones
(Continued on page 28)



CONJUGATE FOCI ON A SECONDARY AXIS

The secondary axis passes through the optic center of the lens, and the conjugate focus C_2 is below the principal axis if the point C_1 is above it.

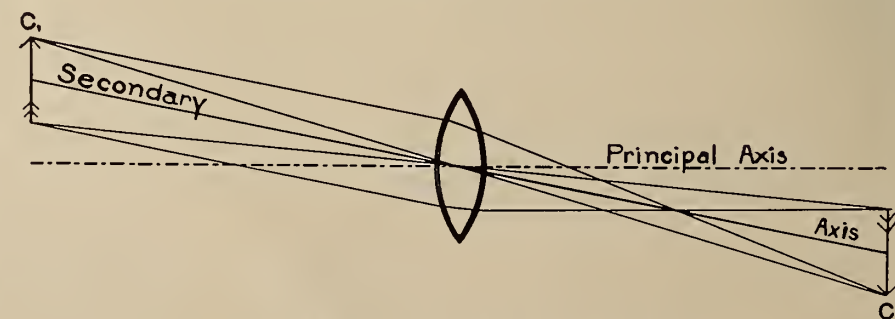


IMAGE FORMATION ON A SECONDARY AXIS

With a good lens, the arrows C_1 and C_2 are both perpendicular to the principal axis. C_2 is the object. C_3 is the image. When object and image are of the same size, as here, the image is as far below the principal axis as the object is above it.

Solidarity Marks IA 40th Convention

THAT the IA is inflexibly determined to resist all demands for wage cuts, which have increased sharply in recent months, was made abundantly clear by the 1100-odd delegates to the 40th bi-ennial convention of this pre-eminent labor organization in the amusement field held in Detroit during the week of Aug. 14. That this line of attack will be pushed vigorously is evidenced by the unanimous approval by the delegates of a proposal to demand an inspection of the books of exhibitors who ask for wage cuts on the score of "poor business."

Other important business transacted at the convention related to an industry-wide pension-welfare plan to cover all IA crafts; an organizational drive aimed at the production and recording of films in the New York City area, irrespective of the type of production and the use for which it is ultimately intended; the formulation of plans for extending IA influence in the television field; an investigation of the effect of ever-increasing production of films in foreign countries on the economic welfare of the studio crafts, and the awarding of exclusive jurisdiction over drive-in loudspeakers and associated equipment to the projectionist local unions.

It was no surprise to those who have watched the increasing cohesiveness of the IA administrative department that the entire slate of incumbent officers was re-elected without opposition.

Foreign Film Production

The one issue confronting the convention that was expected to be ignited by a blaze of verbal fireworks—film production in foreign countries and its concomitant loss of jobs to the West Coast studio workers—fizzled out in a routine recommendation to refer the matter to the General Executive Board. The proposal made was that American companies be required to take a minimum crew of American workers along on any foreign production jaunt.

The almost complete lack of controversy which marked this convention is probably best illustrated by the fact that an extended discussion centered upon the comparatively inconsequential issue of whether the larger Local Unions, with numerically strong voting strength, should be restricted to a maximum of 10 delegates to an IA convention even though their total voting power would not be impaired. The proposal was advanced as an "economy" measure—that is, in terms of convention expense.

The larger Locals, comprising more than 25% of the membership and per capita-paying strength of the Alliance, fought this proposal assiduously, con-

tending that a limited personnel delegation was undemocratic in that it infringed on Local autonomy no less than that it restricted severely the opportunity to afford convention training to the younger members who are almost invariably included in a large delegation.

Leading the fight for the larger Locals were Storin, Local 306; Francavilla, Local 702; Pernick and Gately, Local 1—all of New York City—and Olson, Local 164, Milwaukee. The concurring recommendation of the executive Board was overridden despite the strenuous defense of its position by "Cappy" DuVal of Local 44, Hollywood.

Pension-Welfare Plan

The pension-welfare plan, which has been the beneficiary of innumerable resolutions and a plethora of speeches at conventions over a period of years (mainly by the so-called oldsters in the IA) was once more referred to the Executive Board for consideration. President Dick Walsh is represented as feeling that an over-all industry plan would be particularly difficult to apply and that it would encroach upon Local autonomy.

The more vociferous proponents of the pension plan point to the successful operation of a pension-welfare plan by Chicago Local 110 (projectionist) over the past two years, with the exhibitors paying all the costs. The more conservative backers of the plan, however, are aware that such a move is dependent in large measure upon how tightly-knit a given Local is and the degree of strength it exerts in its own locality.

There was practically unanimity of opinion among the delegates that while the IA has scored many gains in the television field, and especially in terms of stagehand manpower in the large studios in big cities, probably the toughest organizing fight lies ahead of the Alliance in extending its influence throughout the Tv field. Even as a straightaway organizing job the task would be very difficult, but the IA is confronted not only with

this chore but with the necessity for engaging in what promises to be a widespread and bitter jurisdictional battle with other units which seek to entrench themselves in the Tv field.

Irregular Pattern in Tv Field

IA organization in the Tv field currently offers an irregular pattern, with the outcome in many sectors depending almost wholly upon the degree of initiative displayed by Local officers. Chicago, for example, has gained 100% IA representation in the studios, and New York City Local 1 has done a bangup job on the stagehand end. In other localities it has been rather rugged going for the IA, with compromises having been necessary in order to gain even a foothold.

It would seem to all boil down to the degree of alertness exhibited by IA Local officers in their own territories, with one of the most important functions being to get the jump on other organizations. This problem would seem to require the concerted best efforts of IA officials for several years ahead.

Recent developments in the expanding drive-in theater field have seen much work lost to IA members through the operations of "independent" contractors and by fly-by-night "technicians" who contract for installation and repair work at ridiculously low prices. Particularly concerned anent this trend are the various Locals affected and the soundmen affiliated with the major servicing companies.

As one means of curbing such practices, the IA convention approved a proposal which grants exclusive jurisdiction over drive-in theater loudspeakers and associated equipment to the projectionist Locals. In the past, stagehands have been doing a portion of this work, and it is felt that such a division of work is not in the interest of efficient operation.

Other Resolutions Approved

The convention granted free life-membership to World War II amputees and paraplegics unable to work; extended membership eligibility to British subjects living in Canada; favored the outlawing of Communism by legislation; supported the U.S. in the Korean conflict; disapproved the employment of any IA member sympathetic to Communism, and urged an amendment to the wage-and-hour law which would reduce the present 8-hour day, 40-hour week.

Additional data on and personal notes about delegates to the IA convention will be found in the "In the Spotlight" section on page 18 of this issue.



IA President Richard F. Walsh

Process Projection of Film for Tv

By R. A. LYNN and E. P. BERTERO
Engineering Staff, National Broadcasting Company

Professional projectionists will be very appreciative of the appended article (originally published in *Tele-Tech*, journal of the electronic industries) which describes the equipment and technique for process projection in Tv and provides some interesting contrasts with practices in their own field. This is the first of two installments.

ONE of the pressing television problems is that pertaining to background scenic effects. Proper scenery is necessary to afford satisfactory eye appeal in any studio show. To expedite matters, Tv adopted the method of creating scenic effects in the manner established by the legitimate stage. This consisted of covering the entire space behind the stage setting with such items as paintings, photomurals, drapes or build-up wooden props.

Use of this type of background scenery presents certain objections. Its creation requires time. It is not flexible from the standpoint of handling or storing. An investment of from \$200 to \$400 is required for a photomural.

Problems Peculiar to Tv

Some of these objections would be less important if the background material could be re-used a sufficient number of times to spread the investment over a number of shows. In the legitimate theater this can be done. In Tv, however, the background material has to be expended to avoid monotonous repetition. Even when scenes which are re-used they create a storage problem when they are held over.

Background projection, the system whereby a scene, movie or still, is projected onto a translucent screen, appeared to offer a solution. The cameras and audience are located on the side of the screen opposite the projector. The actors and supporting foreground material are located between the camera and the translucent screen.

Certain minimum requirements must be met for satisfactory background projection. First, sufficient projection illumination must appear on the screen. It must be realized that live actors in front of the screen will be illuminated by foreground lighting. Inevitably, some of this lighting will spill over onto the projection screen and tend to reduce the contrast between highlights and shadows of the projected effect.

We have determined that at least 2000

lumens are necessary to meet all ordinary requirements, which level is equivalent to approximately 20 foot-candles on a screen 9 x 12 feet. Less light is available when a photographic slide is inserted—the denser the slide, the less the light. It must also be realized that although the projection screen is translucent, considerable light is absorbed by it. Present white screens have a transmission of approximately 70%. This means that the actual light available for pickup by the Tv camera sometimes runs as low as 5 foot-candles.

Contrast with Film Industry

Engineers experienced in motion picture photography may consider that the amount of light available is so low as to be useless. However, the system works, although care must be exercised to avoid excessive amounts of spill light.

The resulting picture sometimes ap-

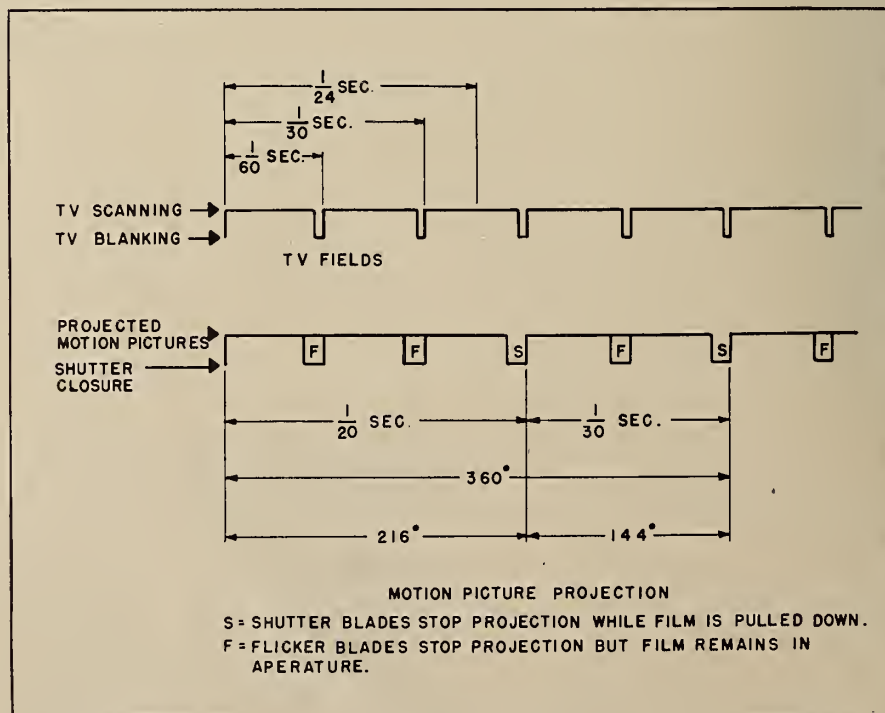
pears to the studio audience to be washed out to the point of being almost indistinguishable. This is especially true to the audience located off to the side of the screen. Nevertheless, the Tv camera, located approximately on a direct line through the screen to the projector, picks up a usable picture. It should be remembered, also, that successful operation under conditions of low light levels is credited to the sensitivity of the image orthicon camera tube used by NBC.

Another requirement for the system is that the "throw" should be as short as possible. To achieve a short throw, a short focal length lens must be used. Unless carefully designed, short focal length lenses are inclined to give poor resolution in the corners of the picture. Satisfactory results were obtained from a lens of 4.8-inch focal length with a speed of F:3.5. This requires a throw distance of 18 feet, 10 inches when using the standard 3¼ x 4 inch theater slide masked to 2¼ x 3 inches. Unmasked slides (i.e., 3 x 3¾ in.) gives a 3 ft., 10 in. reduction in throw distance.

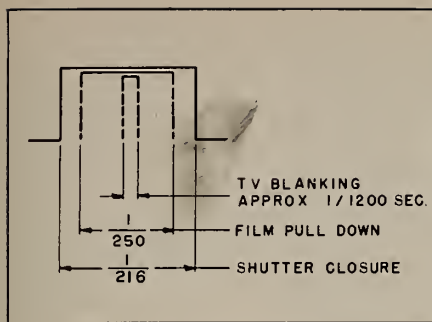
The first projector was a Bodde Type P-55 using a 5 kw incandescent lamp. The optical condenser system consists of a reflector, meniscus lens, two plano-convex lenses, and a heat-absorbing filter. The lens was a 6-inch E.F. at F:3.5 speed. Resolutions and speed were satisfactory; however, to shorten the throw distance a 4.8 inch lens was used.

Cooling the Lamp Housing

The heat generated by the 5 kw is intense. Of the two blowers located within the lamp housing, one directs the air



Time relationships involved in rapid pull-down and scanning in the Holmes high-speed projector. The operation of the shutter is apparent from this diagram.



Typical Tv film pull-down sequence.

around the lamp bulb and thence up to the stack; the other cools the heat filter, condensers and slide. Heat shields are installed above the blower motors to protect them from direct radiation from the lamp bulb. A third blower located outside of the housing cools the lamp bulb to prevent blistering the envelope.

With a new lamp and with careful adjustments of the condenser lens system, it is possible to obtain approximately 5000 lumens (this is 47 foot-candles on the 9 x 12-foot screen). At least 2000 lumens are required. Thus a new lamp gives a good margin of safety. Blackening of the bulb causes the illumination to decrease, and care must be exercised to see that it does not remain in service beyond the point of minimum light requirements.

The life of the lamp bulb, based on "burnout," is rated at 75 hours; however, the lamps are generally relegated to preliminary rehearsal purposes at the end of 35 hours to avoid possible burnouts while on the air.

More recently a Bodde projector utilizing a 2 kw bulb was obtained (Fig. 1). To obtain greater light the bulb is operated at 150 volts instead of its rated 115 volts. Both the light and the heat outputs are very intense at this over-voltage. About 100 foot-candles of light are incident on the 9 x 12-foot screen, equivalent to approximately 11,000 lumens.

The 4 x 5-inch slides are of single thickness. Although strains due to uneven heating are thus reduced, a new hazard—that of scratching the emulsion during handling—is introduced. Compared with the 3½ x 4-inch slide, however, less magnification is required to enlarge them to fill the 9 x 12-foot screen. This requires a shorter projection distance. However, greater demands are placed on the projection lens in that it must have a greater covering power to avoid deterioration of resolution in the corners of the picture.

Cine Background Projection

Heat-absorbing glass is not used, this avoiding a 30% loss of light. However, this additional heat must be dissipated by some means. The fact that the slide is only single thickness and that there is

a strong air blast directed on it is expected to prevent cracking.

The use of optically projected stills was very successful for many NBC productions. However, productions could be greatly enhanced if the background scenery were animated. Rear projection of motion pictures is by no means new, the film industry having used this type of effect for many years.

The system employed by the movie-makers must be modified, however, before it can be used in Tv because of problems peculiar to Tv. Besides the usual considerations of limited studio space, ease and quietness of operation in a live Tv studio,

and portability of equipment, motion picture rear projection introduces other problems.

The first decisions pertained to the film size, which in the theater field is 35 mm. Rules and regulations pertaining to the use of 35-mm film in a New York City studio introduce many problems—fireproof rooms, vents to the outside atmosphere, flameproof lamp enclosures, restrictions on the quantity and storage of film, restrictions on an audience, etc., which make it almost impossible to introduce this system into existing studios. By contrast, 16-mm film, made on a

(Continued on page 22)

STANDARD DIMENSIONS FOR PROJECTION ROOMS

Promulgated by American Standards Association

1. Projection Lens Height

1.1 The standard height from the floor to the center of the projection lens of a motion picture projector should be 48 inches.

2. Projection Angle

2.1 The projection angle should not exceed 12 degrees.

3. Observation Port

3.1 The observation port should be 12 inches wide and 14 inches high and the distance from the floor to the bottom of the openings shall be 48 inches. The bottom of the opening should be splayed 15 degrees downward. If the thickness of the projection room wall should exceed 12 inches, each side should be splayed 15 degrees.

4. Projection Lens Mounting

4.1 The projection lens should be so mounted that the light from all parts of the aperture shall traverse an uninterrupted part of the entire surface of the lens.

5. Projection Lens Focal Length

5.1 The focal length of motion picture projection lenses should increase in ¼-inch steps up to 8 inches, and in ½-inch steps from 8 to 9 inches.

6. Projection Objectives, Focal Markings

6.1 Projection objectives should have the equivalent focal length marked thereon in inches, quarters, and halves of an inch, or in decimals, with a plus (+) or minus (—) tolerance not to exceed 1 percent of the designated focal length also marked by proper sign following the figure.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

THE 40th bi-ennial convention of the International Alliance opened in Detroit, Mich. last month with an attendance of more than 1100 delegates. It was good to meet with old friends again and to reminisce about IA personalities—past and present. Many of the old familiar faces are gone and the ranks of oldtimers grow smaller and smaller at each convention. But however nostalgic we may become for the “old days” and the “old friends,” there still is the thrill of renewing old acquaintances and welcoming the newcomers to our ranks.

We have attended many IA conventions without any political axes to grind, merely as a reporter for these columns. At the recent convention, as many times before, we were struck with the thought that a course in parliamentary rules and laws ought to be a “must” for delegates representing their Locals for the first time. We recall when an International president, presiding at a convention some years ago, put a motion to vote *before* taking action on the proposed amendment. Since that day, however, we have made great strides forward and are not apt to pull such boners.

(A detailed report of Convention pro-

ceedings will be found on page 15 of this issue.)

Personalities at the Convention

- Among the newcomers to the Detroit Convention was Jim Farmer, delegate from Honolulu Local 665. This was the first time in the Local’s history that it was represented at an IA convention. We understand that the delegate’s expenses from Honolulu to San Francisco were paid by the Local and that the IA took over from that point on.

- Charlie Crickmore, delegate from Seattle Local 15 and one of the few remaining former assistant IA presidents, installed the reelected officers for the ensuing term.

- This department wishes to publicly thank Ray Colvin, president of TEDA, for the very fine tribute he paid this publication when he addressed the gathering on the opening day of the convention. Ray pointed out that IP is the only publication that consistently champions the cause of the craft and he urged every delegate present to lend it his support. We were called out of the meeting hall just before Ray delivered his talk and

when we returned he had already left the rostrum. However, scores of delegates lost little time in rushing to our side to inform us of his fine tribute. Thanks, Ray.

- Police Commissioner Earl J. McCannel, delegate from Local 510, Fargo, N. Dak., lost his police badge while enjoying a boatride up the Detroit River. Won’t somebody please call a cop?

- Two oldtimers from Local 466, Fort Wayne, Ind.—Ellis Karns and Ed Winans, former officials of the Local—attended the convention as visitors. For many years they represented Local 466 at IA conventions, but this year they came as onlookers.

- Eric Johnston, president of the Motion Picture Assoc. of America (producers) suggested the addition to the U. S. delegation at the United Nations of labor leaders who have licked Communism in their own unions. “Our labor leaders are used to Jacob Maliks,” he said. “They have had to deal with American-style Maliks for years, so that they are up on all the Communist techniques and on how to overcome them.”

- The Statler Hotel was the scene of a bang-up party given by Chicago Local 110 for the delegates of its sister Locals. Among the invited guests present were Frank X. Martel, president of the Detroit and Wayne County Federation of Labor; and Joe Keenan, director of LLPE (Labor League for Political Education) of the American Federation of Labor. Needless to say, the Chicago delegation went all-out in welcoming the guests and the party was one of the top events of the week.

- A resolution limiting the number of delegates from any Local Union, regardless of size, which was recommended by the General Executive Board, touched off a hot debate on the floor. A veritable barrage of fireworks started by Harry Storin, New York Local 306, followed by Solly Pernick and Ed Gately, New York Local 1, Oscar Olson, Milwaukee

PART OF IA OFFICIAL FAMILY ON DAIS AT OPENING OF 40th CONVENTION



Tommy Shea, assistant IA president; Harland Holmden, 1st vice-pres.; Tommy Green, International representative and delegate to the AF of L convention; Harry Abbott, 8th vice-pres.; Jimmy Brennan, 4th vice-pres.; Louise Wright, 9th vice-pres.; Floyd Billingsley, 3rd vice-pres.; William Raoul, General sec.-treas.; IA President Walsh and (behind Raoul) Ray Colvin, executive director of Theater Equipment Dealers Association.



Delegates gave a rising ovation as President Dick Walsh (left) received gavel from Roger Kennedy fifth vice-pres. and business manager of Detroit L. 199, at convention opening.

Local 164, and John Francavilla, New York Local 702 quickly reversed the recommendation. Cappy DuVal, Hollywood Local 44, spoke in favor of the resolution.

- Alonzo Bennett and V. Martz, delegates from Local 521, Long Beach, Calif., accompanied by their wives, took a roundabout trip home, stopping off at Toronto, Montreal, Quebec, Halifax, New York City, etc., continuing along the Southern route.

- Bill Covert, 2nd IA vice-president, who is recuperating from a serious illness, was unable to attend the convention, the first one he missed since 1917. Bill was re-elected in absentia—a rare occurrence in IA history.

- Newly-elected District secretaries are Rene Rouleau, District No. 1; Bill Daul, No. 2; Philip Bordonaro, No. 4; LeRoy Upton, No. 9, and J. W. Murphy, No. 15.

- The best story-teller at the convention was Luther Thompson, of Pittsburgh Local 171. Luther kept the delegates in gales of laughter with his witty anecdotes and his keen sense of humor. Running him a close second in this field was Arthur Lyday, Indianapolis Local 194, and Wally Byrne, New York Local 306, who attended the convention as a visitor.

- International Projector Corp and National Theater Supply Co. were represented by Herb Griffin, who welcomed the many visitors to the NTS headquarters. Herb is a member of New York Local 306 and the 25-30 Club, and has scores of friends in the Alliance.

- Two record-holders are Harry Pearson of Vancouver Local 118, and Orin M. Jacobson, Tacoma Local 175, who have attended every IA convention since 1919.

- An old friendship dating back many, many years was revived with the meeting between Houston Morton, Detroit Local 199, and John McLean and Gus Kelly, of Knoxville Local 405. Morton originally was a member of Local 405, transferring

to the Detroit Local in 1913. These old-timers had a grand time rehashing their experiences in organizing the Knoxville Local, recalling how they picketed the theaters practically barefooted until they broke down the exhibitors' opposition to the Local.

[As this issue of IP went to press, we were saddened by the news of Houston Morton's death, caused by an ailment which incapacitated him for several years. We salute the memory of a courageous man who was a credit to the IA. To his widow our deepest sympathy.]

- "Open house" was the keyword at New York Local 306 headquarters. All visitors were cordially received and made most welcome by the 306 delegation.

- This was the second IA convention at which the national anthem was sung by Lenore Pernick, daughter of the business representative of New York Local 1. Solly was mighty proud of his filly, as well he might be, and a bright future is predicted for the young lady.

- A newly-born son greeted Charlie Vencill, secretary for Los Angeles Local 150, upon his return home from the convention. Our heartiest congratulations to the parents.

- Charlie Hahn (McAuley's Peerless Lamp) was kept pretty busy giving forth with the technical information that many of the boys were seeking. The man's savvy on matters technical is amazing.

- The National Carbon boys, headed by Bill Kunzmann, Jack Nolan, Chester Heppberger, and Paul Reis, rolled out the welcome mat at the NCC headquarters. Their hospitality was boundless—the doors were open until the wee hours



President Dick Walsh welcoming to the IA Convention Eric A. Johnston, president of the Motion Picture Association of America, producers' organization.

of the morning. In addition to the refreshments, which were plentiful, pocket flashlights were given out as souvenirs. The goodwill gained for the company is invaluable.

- The delegation from Boston Local 182—Joe Nuzzolo, Sr., Walter Diehl, Joe Caplan, and Harold Armitstead—were so engrossed in convention proceedings that they had very little time for outside matters. At the close of the sessions, however, they gave themselves over to a bit of relaxation.

- The sound system in the convention hall was installed by RCA. President Walsh thanked the company for its splendid cooperation.

- J. E. Biggerstaff, business representative for Winnipeg Local 299, was elected delegate to the Canadian Trades and Labor Congress, succeeding Hugh Sedgwick of Local 303, Hamilton.

- Membership in the Alliance for 53 years is the record rolled up by Dave

DEARBORN, MICH., VETERANS HOSPITAL BENEFITS THRU LEGION THEATRICAL POST 371



Legion District Commander James B. Elliot inspects sound motion picture equipment donated by Legion Post 371, many members of which are affiliated with theatrical crafts. Left to right, Comm. Elliot, H. O. Blough (past commander), IA Local 199; two hospital patients, and W. J. Stolz, IA Local 199. Kneeling: Warren Cushing, recreational director.

Rosenthal, secretary for the past 31 years of Memphis Local 69. Although Dave admits to 71 years, he looks as hale and hearty as a man many years his junior. He is a 33rd-degree Mason, holding membership in the St. Cecile Lodge of New York City, and is a director of Shrine Temple Al Chymia.

- Frank Galluzzo, vice-president of Chicago 110, was one of the stay-up-all-nighters. As a matter of fact, it looked for a while as though he might join up with the Detroit Fire Department as a further excuse for not getting to bed.

- The various committees of the Detroit Local Unions were given a rising vote of thanks from the entire convention for the splendid job they did in providing entertainment for the delegates and visitors. In addition to serving refreshments at their "open house" headquarters, they provided the delegates with tickets to the Tiger-White Sox ball game, arranged for a delightful boatride up the Detroit River, tickets to movies, and many other forms of entertainment.

- Orin M. Jacobson, of Tacoma Local 175, who recently resigned as secretary of District No. 1 after holding the office for 24 years, was presented with a check for \$1000 in appreciation for the very fine services he rendered the organization.

- The Wisconsin Assoc. of Stage Employees and Projectionists held its annual meeting last month in Oshkosh, Wis., in conjunction with the annual convention of the Wisconsin State Federation of Labor. The meeting was conducted by Felix Snow, 6th IA vice-president, who was assisted by William Donnelly, IA representative. Oscar Olson, delegate from Milwaukee Local 164, addressed the gathering and urged that every effort be made to strengthen the Association. Additional talks were made by Snow, Donnelly, and Glenn Kalkhoff, the latter now serving as the Association secretary. The conference closed with a delicious luncheon (and suitable refreshments, of course) sponsored by Oshkosh Local 167.

- TMA (Theatrical Mutual Association) Lodge No. 4, Chicago, recently presented past president Frank Galluzzo with a



Frank Galluzzo, vice-president of Chicago L. 110, former Grand Sec.-Treas. of TMA nationally, and past president of Chicago TMA Lodge for six consecutive terms.

Craft Influences Unit Sales

By Ray Colvin, executive secretary of the Theater Equipment Supply Dealers of the U. S. & Canada, at the IA Convention: "... From your ranks have come many of the men who are today theater equipment dealers, and it was at your hands that they received their early training. Many of them still are members of your organization.

"The theater equipment dealers look upon you men, you projectionists and you stage employes, as the first stepping-stone to the successful sale of new equipment. We know quite well that when the theater management contemplates the purchase of new theater equipment, the very first one they go to, the one from whom they seek advice, is the projectionist or the stage employe—the man on the job!"

streamlined 1950 5-h.p. Scott-Atwater outboard motor. Galluzzo served six consecutive terms in office and under his guidance the Lodge trebled its membership and strengthened its financial position.

Galluzzo's activities were not confined to the Chicago Lodge but extended into the affairs of the Grand Lodge, where he served very capably as Grand Secretary-Treasurer, and is at present a member of the Laws Appeals and Grievance Committee.

- With installations of RCA theater television equipment scheduled for ten cities this Fall, the IA and the RCA Service Co. inaugurated on Sept. 11 a special theater Tv training program for projectionists. Thirty selected projectionists from various large cities throughout the U. S. reported at the RCA plant in Camden, N. J., for a week-long course in Tv.

The trainees were greeted by President Dick Walsh of the IA; Edward C. Cahill, president of RCA Service Co., and Barton Kreuzer, manager of the RCA Theater, Visual and Sound Dept. President Walsh hailed the program as "another example of IA policy of keeping its members abreast of all new technical developments in their field"; while Mr. Cahill said that the training course "is in keeping with RCA's long-standing practice of rendering all possible technical assistance to projectionists and the trade in general."

The study course included instruction in all phases of theater Tv equipment theory and operation. An actual RCA theater Tv system was used in class, and RCA also furnished operating and reference manuals and other technical data.

- The 7th District recently presented General Secretary Treasurer Wm. P. (Fred) Raoul with a 1950 Cadillac sedan, beautifully equipped with all the latest

gadgets. R. E. (Rut) Morris, District secretary for the past 28 years, told us that the car is a dream to behold. Happy driving, Fred.

- Larry Davee, sales manager for the Century Projector Corp., is a proud dad these days, basking in the plaudits thrown in the direction of his 14-year-old son, Larry, Jr., for rescuing a girl from drowning. The incident took place at Sebac Lake, Maine, where the Davees have a summer home.

- Vancouver Local 348 concluded negotiations with four more theaters—Main, Studio, Seva, and the Lougheed Drive-In—leaving just one hold-out, a small independent theater. The newly-signed contracts provide for a 25c hourly increase.

- Here is a tip for our Florida-bound brothers: If, while driving through the town of Stuart, Fla., you are stopped for some traffic violation, ask to see the town's deputy sheriff—who is none other than Neil Bishop, member of Chicago Local 110. Neil makes his home in Stuart for about nine months of the year and is one of its leading citizens.

- Recent out-of-town visitors to the offices of IP: Kimball Cummings, Local 219, Minneapolis, Minn.; Alonzo Bennett, V. Martz, Local 521, Long Beach, Calif.; Bill Daugherty, Local 384, Hudson Co., N. J.; Joe Selo, Eddie Miller, and Frank (Bumps) Coogler, Local 279, Houston Texas.

Tv Weaning Kid Movie Audience Away

Backing the contention that television is weaning away from film theaters its important kid audience is the result of a FILM DAILY survey which shows a total of 36 hours per week of children's program telecast by six New York area Tv stations. Count includes 31 programs planned exclusively for youngsters—excluding Westerns and feature films.

Telecast mostly between 5:00 and 8:00 p.m. through the week, and almost all day Sunday, offerings range from puppet and marionette shows, through drawing classes, amateur talent hunts, circuses and Western stories.

Programs, mostly sponsored, are usually aired over the networks and not confined to the New York outlets, survey indicated.

N. Y.-Chicago Radio Relay Leg Opens

A. T. & T. started service on its 838-mile radio relay circuit between New York and Chicago on Sept. 1. System, capable of transmitting several television programs, as well as hundreds of telephone calls, will supplement existing relay facilities between the cities. An additional 458-mile radio relay system goes into operation on Sept. 30 between Chicago and Omaha, joining with the present Omaha-Denver link.

Coast-to-coast radio relay facilities will be available for use late in 1951.

Magnetic Recording Upsurge in Studios

By LOREN D. RYDER

Director of Sound Recording, Paramount Pictures

Quite apparent from this contribution, originally appearing in *American Cinematographer*, are the twin facts that magnetic recording is super-efficient in both quality and cost and that it presents another grave problem to the already hard-pressed studio workers in their continuing struggle to maintain the employment level.

THE modern system of utilizing magnetic recording to effect a large saving in production costs in the studios includes a suitcase production recording channel using 17½-mm magnetic film, a system of transferring the print "takes" to direct positive photographic film for editing, and an edge-numbering device for identification and synchronization of all film. At the Paramount studio, 35-mm magnetic film is used for all dubbing and scoring. The transferal during picture finishing is largely magnetic-to-magnetic.

The production recording channel includes a two-dial mixer, a power unit, and a recorder. The complete channel, loaded ready for use, weighs under 100 pounds. In operation, two recorders are assigned to production, each loaded with 2500 feet of magnetic film. This eliminates loading delays and minimizes run-outs.

Completely Automatic Operation

These recorders are completely automatic in operation and are turned over and "killed" along with the camera under the control of the cameraman, thus eliminating signalling and turnover delays. On location, the speed control is automatic and absolute. Synchronization is automatic and without clappsticks. Trouble-shooting on production is eliminated. The equipments are exchanged in case of trouble or even suspicion of trouble.

Subsequent to the day's work the print takes are transferred from magnetic to direct-positive photographic "electroprints," which in turn are developed and used for editing. The transfer reproducer is equipped with a counter and is capable of fast winding both forward and backward.

The operator first winds down through the roll, monitoring and checking his log, until the synchronization click for the first print "take" is located. The transfer is then made electrically to the direct-positive print.

The direct-positive recording machine is equipped with a special photographic marking device that exposes the production number, scene number, the take number and the footage at one-foot intervals along the edge of the film. The

sound recording is by the supersonic, direct-positive, variable-density method.

Simplified Procedure

Two rack-mounted panel-type recording units are used for each scoring channel. The machines are used alternately: 1,000-foot lengths of 35-mm magnetic film are threaded on a head-sync mark and wound down to the predetermined footage for the start of music. While the first take is in progress, the second recording machine is threaded. When a print is obtained, it is ready to go to the dubbing channel without the cost and delay of cutting or re-synchronization. The out-takes are subsequently erased.

If playbacks are required, they are made *instantaneously* from the *production* recording.

Special transferring machines are used for the synchronization of sound effects and to supply the magnetic sound print for dubbing. Transferring replaces cutting and splicing. Magnetic sound effects from the library are transferred to 1000-foot lengths of magnetic film in the correct position for dubbing; in other words, continuous 1000-foot lengths of magnetic

Projectionist Civil Service Exams

A civil service examination for motion picture projectionist has recently been announced for filling positions paying from \$2,650 to \$3,825 a year in various Federal agencies in Washington, D. C., and vicinity. To qualify, applicants must pass a written test and have had from 1 to 4 years of experience in the operation, maintenance, and repair of motion picture sound projection machines and equipment. A resident course, or an Armed Forces training course in photography or motion picture projection consisting of at least 200 hours of instruction or supervised laboratory work, may be substituted for 3 months of the required experience.

The age limits, 18 to 62 years, will be waived for persons entitled to veteran preference.

Full information and application forms may be obtained from most first- or second-class post offices, from civil service regional offices, or from the U. S. Civil Service Commission, Washington 25, D. C. Applications must be filed with the Commission's Washington office not later than October 12.

film replace the cut-together effects sound tracks now used in dubbing.

In a similar manner, original magnetic dialogue is transferred to 1000-foot lengths of magnetic film so as to give a magnetic duplicate of the cutting print. Synchronization is established by the edge-numbers previously mentioned. All dubbing work is to magnetic film, thence transferred to the release negative.

A Single Photographic Negative

It will be observed that the only photographic negative used in the entire plant is the negative which is used for release printing! This not only saves the cost of the negative film but also eliminates the cost of processing same. It will also be noted that there is no cutting or mutilating of the magnetic film, thus it may be used many times.

In the scoring and dubbing procedures, rehearsals are made on magnetic film, thus the first satisfactory rehearsal is the *printed take*.

Important in this consideration is the fact that the technique and each piece of equipment has been worked out so as to become a part of an overall system. The approach to magnetic recording in general should be on this basis.

'Lucky 13th' Sales Drive by Altec Units

A sales drive embracing the services and products of the ALTEC companies opened on Sept. 13. Known as the Lucky 13th Sales Drive, it will run for 13 weeks and will end on Dec. 13. Cash prizes and extra vacations will be awarded the top salesmen, field managers, and inspectors.

For many years a leader in the quality audio field, Altec pioneered and is currently very active in the In-Built-Home-Music System, which includes radio, disc reproduction and television.

Los Angeles Supply Dealer Changes

J. Edward Miller, for the past 18 years associated with RCA, on July 1 last purchased the controlling interest in the John P. Filbert Theater Supply Co., of Los Angeles.

Another dealer change involved the merger of the Projection Equipment & Maintenance Co. and the Breck Photoplay Supply Co., both of Los Angeles. The company will be known in future as Pembrex Theater Supply Corp., with main offices at 1969 So. Vermont Ave. The firm will be headed by L. M. Wutke and J. E. Maguire.

Signal Corps Needs Photo Engineers

Technical liaison engineers with photo or motion picture backgrounds are urgently needed by the U. S. Army Signal Corps at once. Salaries for these posts range up to \$5400 annually. Applicants should communicate with Ed Sutherland, Signal Corps Engineers Laboratories, Building 608, Fort Monmouth, New Jersey.



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PROCESS PROJECTION FOR TELEVISION FILM

(Continued from page 17)

safety base, is not burdened with such restrictions.

Another problem arose due to the fact that motion pictures are based on a 24-frame-per-second system, while Tv is based on 30 frames p.s. Experiments were conducted with 30 frames p.s. Although it would be possible to use such a system, it necessitated creating a library of films photographed at the non-

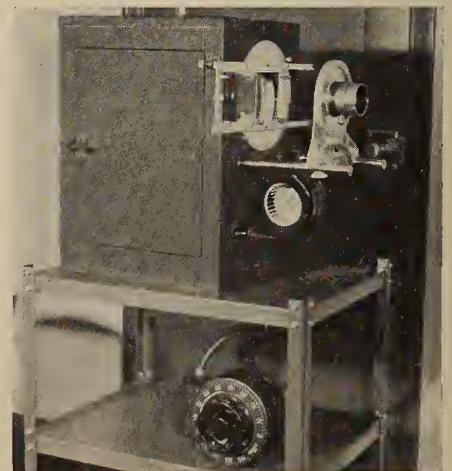


Projection enclosure complete with water-filter arclamp exhaust and ventilating system. Projection may be by either front or side windows, depending upon length of throw.

standard rate of 30 frames p.s. This non-standard film would be restricted to use for background projection.

The alternative of using regular 24-frame material speeded up to 30 frames p.s. was discarded since this would speed up all action by a factor of 5/4. It was therefore decided to concentrate efforts on obtaining a unit with an intermittent with a 3-2 ratio. This means that a motion picture frame is pulled into the

Latest model Bodde slide projector using a 2-kw lamp. By over-volting lamp to 150 volts, 100 foot-candles are obtained.



aperture and remains there for 1/20 second.

During this time the Tv beam scans 3 complete fields. The projector shutter then closes, pulldown is applied very rapidly, and the next frame remains in the aperture for 1/30 second while the Tv beam scans two fields. The cycle is then repeated.

It will be noted that the average speed of the motion picture film is 24 frames p.s., although individual successive frames have rates of 30 and 20 p.s., respectively.

The principle of the 3-2 system has already been utilized by Tv with an associated iconoscope pickup tube. In this case, projection takes place during the blanking of the Tv signal, the sensitive surface of the iconoscope storing the image until it is scanned off by the beam. During the scanning process the motion picture projector shutter is closed and the next frame is pulled into position. Thus a relatively long time is available for film pulldown.

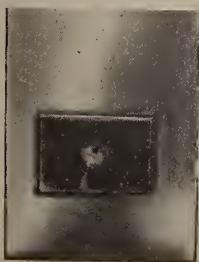
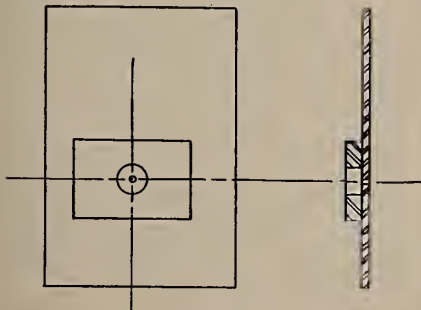
[To be Concluded]

Improved Pinhole Test Plates Readied by Heyer-Shultz

PROJECTIONISTS are aware of the fact that if the arc, reflector, aperture and lens are to work together as a coordinated unit (which it most certainly should be) all elements in the group must be in optical alignment—*accurate* alignment.

One of the most efficient means for effecting such alignment is the self-centering film track pinhole plate produced by Heyer-Shultz Co., which introduced the first truly efficient all-metal reflectors. The pinhole plate now offered by H-S, utilizing the arclight rays, is a substantial improvement over the first such method employed.

The new-style H-S plate is designed to be placed in the film track, with the positioning block, which is spot-welded to one side of the plate, inserted into the aperture opening itself. This plate is a precision aligning tool,



Representation in line and in halftone of the Heyer-Shultz pinhole aperture test plates.

because the positioning block guarantees absolute pinhole centralization on the film line in any make of standard 35-mm sound projector.

Two Sizes of Plates Available

H-S makes two sizes of pinhole plates—2-inch and 6-inch. The 2-inch size may be used as-is in all projectors. The 6-inch plate is designed so as to be more easily inserted into the film track. It extends above the gate and film track, where it may be grasped with the fingers and held in place while the gate is closed.

In some projector heads the 6-inch plate may be used in the flat form in which it is received. In other heads there is insufficient

room for a plate of that length, and it is necessary to fit it to the head by bending the top of the plate away from the film track, thus assuming the position the film would take were it in place of the plate. With the film track pinhole plate fitted in this manner, it then becomes a permanent unit of equipment. (Bending is easily accomplished with pliers.)

The film track pinhole plate is made of polished stainless steel, with the rounded corners which result from polishing protecting the film track and gate from any possible scratching. Instructions for using these plates may be found in a booklet which is available free of charge upon request to Heyer-Schultz, Cedar Grove, New Jersey.



With RCA's NEW Comprehensive Parts and Repair Plan

YOU GET *maximum* protection against costly shutdowns with the RCA Comprehensive Parts and Repair Plan. It's tailored to fit your individual needs, regardless of make or type equipment you use.

The money-saving security advantages of this Plan are yours at a cost so low, a few admissions daily pay for it. Some of the services you get are:

Replacement of vacuum tubes, exciter lamps and mechanical parts for sound equipment which fail from normal usage . . . including amplifiers, soundheads, power supplies, faders and speakers.

A-1 maintenance of your projectors. Material installed in the booth by your projectionist is supplied by RCA, transportation prepaid.

Replacement parts for arc lamps, power supplies (including tubes for rectifiers), magazines, hand and automatic rewinds, film splicers. The plan can even include such expendables as reels, film cement, lens cleaner and oil!

Major repairs and complete overhaul of projectors, intermittent assemblies and motor-generators are included, too. For such repairs outside the theatre, RCA pays labor and transportation as well as material costs. And you can even get a "loaner" unit at no charge while yours is being repaired.

Don't gamble with costly, unexpected repairs. Protect yourself with the RCA Comprehensive Parts and Repair Plan. Write for free new folder—"Performance Security."



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Motiograph's New 'Hi-Power' Generators in Two Sizes

MOTIOGRAPH announces the availability of two "Hi-Power" generators which encompass the 40-to-125 ampere range. Model 1798 will serve arc lamps operating at any amperage between 40 and 70, with arc voltage from 27.5 to 40; while the Model S-9601 covers from 65 to 125 amperes, at arc voltages of from 38 to 65. These ratings are on the basis of 100% overload for five minutes during the changeover period.

It is possible, for example, to use Model 1798 with arc lamps operating at 40 amperes and 27.5 arc voltage, and later, if desired, change to arc lamps operating up to 70 amperes without the cost of installing a more powerful generator, different ballast resistors, and complete new wiring. The electrical connections only would need to be changed.

Extreme Unit Flexibility

Model S-9601 can be initially used with simplified high-intensity arc lamps at any desired current from 65 amperes up. If at a later date the theater owner should elect to use arclamps which operate at 75 to 125 amperes, there is no necessity for replacing either the generator or the ballast resistors.

A Hi-Power generator includes, without extra charge, a control panel, one ammeter for each lamp, a field rheostat, ballast resistors, and a full magnetic starter with an external stop-start push button station, so there are no more accessories to buy. Even nine 30-foot coded leads, to connect the control panel with the generator, are furnished. The fully automatic motor starting switch and the ballast resistors are an integral part of the Hi-Power assembly.

Power Ratings; Vibration-Free

Both models of Motiograph generators may be used wherever 208, 220/440-volt, 50- or 60-cycle, two- or three-phase current is available. The 70/140-ampere Hi-Power generator has been designed to operate vertically, occupying floor space of less than four square feet, thus permitting installation right in the projection room. Of the two-bearing type, Hi-Power generators are consequently free from the vibration inherent in some types of coupled generators, and the bearing wear and maintenance is infinitesimal.

Both Hi-Power generators have a magnetic starter with remote stop-start push-



Motiograph 'Hi-Power,' 125-250-amp. generator.

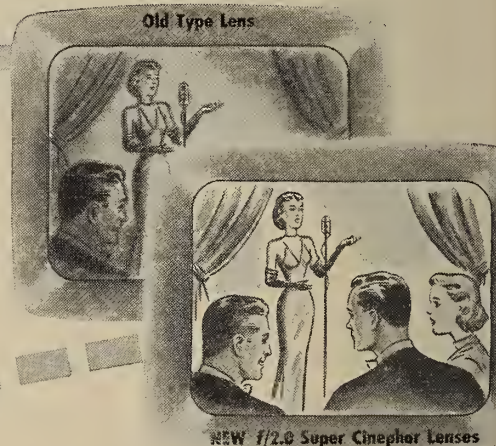
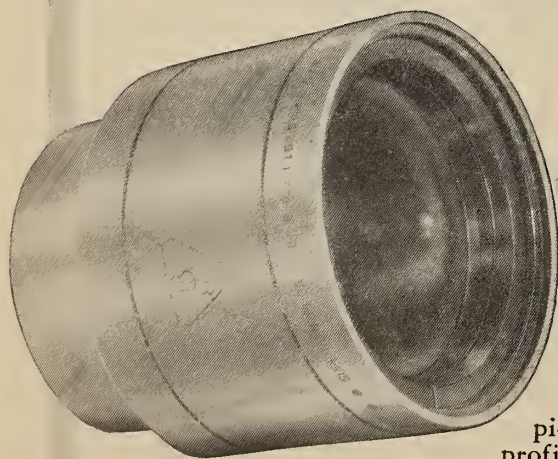
button control, and these starters also have an exclusive self-protecting device consisting of snap-action thermostats and current transformers built into the windings. Burnouts are thus precluded.

Other Operating Advantages

Both generators have a laminated steel magnetic circuit instead of the usual cast-iron construction. In addition to reducing eddy current losses, the laminated structure greatly increases the generator's responsiveness to the fluctuating demand of the arc.

Many generators are self-exciting, that is, their main fields are connected directly to their own generator brushes. Poor voltage regulation may result because with a sudden application of power the voltage across the generator brushes

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Motiograph 'Hi-Power,' 70-140 ampere generator in vertical mounting to conserve space and permit installation in projection room.

decreases. Hi-Power Model S-9601 uses an inbuilt separate generator to excite the fields of the main generator; thus, regardless of changing load conditions, the field excitation remains constant and the unit will deliver the required power instantly.

In addition to its own dealer organization, Motiograph will utilize, for service and parts, the facilities of Lincoln Electric Co. in more than 100 cities in 44 states and 7 Canadian provinces, and in 45 foreign cities throughout the world.

Propose Sound Screen Standard

Herewith the proposed new standards for sound motion picture screens, as submitted to the American Standards Association by the Society of Motion Picture & Television Engineers, as sectional representatives.

1. Sound Transmission Characteristics

1.1 The sound transmission characteristics of theater projection screens shall be such that the attenuation of 6000 cycles per second, with respect to 1000 cycles per second, is not more than $2\frac{1}{2}$ db, and the attenuation at 10,000 cycles per second, with respect to 1000 cycles per second, is not more than 4 db.

The regularity of response shall be such that there is no variation greater than ± 2 db from a smooth curve at any frequency between 300 and 10,000 cycles per second. The general attenuation at and below 1000 cycles per second should not be greater than 1 db.

2. Method of Measurement

2.1 The sound transmission of the screen shall be measured by means of a loudspeaker, fed by an audio oscillator and amplifier, behind the screen, and a calibrated microphone, amplifier and output meter in front of the screen.

The loudspeaker shall be of the type nor-

mally used in motion picture theaters for the size of screen being tested, and shall be placed so that no part of the loudspeaker is less than 2 feet from an edge of the screen with its mouth parallel to and separated from the screen by the recommended theater installation distance of from 4 to 8 inches (center cell in the case of a curved front multicellular horn).

The microphone shall be located 10 to 12 feet in front of the screen and on the axis of the loudspeaker. The sound transmission of the screen at any frequency is then the difference in the sound level measured with the screen in place and with the screen removed.

2.2 Suitable precautions shall be taken to eliminate or minimize the effect of standing waves in the test room both in front of and behind the screen.

New Tv Release Print Leader

The Subcommittee of the SMPTE Films for Television Committee is working on a proposed first version of a revised type of release print leader. The project was undertaken several months ago when the Tv broadcasters announced that the Academy leader Z22.55 does not meet their needs in at least three important respects.

Precise timing of films, necessary in Tv broadcasting, is not possible. The long series of black frames immediately preceding the picture cause excessive flare under conventional Tv switching procedures and also prevent the control engineer from anticipating the normal picture gain setting for the pic-

ture coming up. Mechanical alignment of projectors and Tv cameras is particularly critical and should be checked, at least approximately, before every picture is aired.

From the outset, it was agreed that any new leader must fill the needs of both Tv and theater interests and should work well on both 35- and 16-mm release prints if it were to be unanimously accepted. Otherwise, serious confusion would be caused in film laboratories and exchanges by two types of leaders.

A 35-mm negative of the new proposal will be available very shortly. If any Tv station desires a trial print, Society headquarters will be glad to supply one in either 16- or 35-mm width.

Warner, Loew's Divestment Date

Dept. of Justice has announced that three-year period allotted Warner Bros. & Loew's Theaters for divorcement and divestiture of their theater holdings began on June 1 last, the date when both circuits were turned down on their appeals to the U. S. Supreme Court for a reversal of a lower court decision.

Loew's Earnings Up Over 1949

Loew's in the 40 weeks ended June 8 had a net profit of \$6,019,441, equal to \$1.17 per common share, compared to \$5,160,773, equal to \$1 per share in the comparable period of last year. Included in the current year's earnings is \$808,020 profit after taxes on sale of capital assets.

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European Cine Technical Developments

CONTINENTAL Europe, birthplace of the high-intensity carbon arc and the fountainhead of many advances in the art of projecting motion pictures, again comes to the fore via two interesting commentaries by R. H. Cricks, technical editor of *Ideal Kinema* (London), whose contributions to the craft and the art are well-known to readers of these pages.

Mr. Cricks discusses first a system for the production of stereoscopic motion pictures which, by no means new and requiring the use of analyzers for each individual viewer (done in America more than 25 years ago), still opens up an avenue for interesting speculation. His second report deals with an idea originating in Germany apropos an intermittently-flashed arc which is not unlike that system espoused by General Electric and others for the projection of motion pictures for Tv broadcast.

Summaries of the Cricks comments are appended hereto:

Stereoscopy via Viewing Aid

Stereoscopy is again in the air. We are promised, in *Telecinema*, a demonstration of the anaglyph system now being perfected. This will require every patron to wear Polaroid viewing spectacles. Many years ago I described herein . . . a system employing a large spherical mirror in place of the screen. At a meeting of French technicians, a similar system was demonstrated in miniature.

Like the previously described system, the picture was projected upon a screen below the large mirror. But whereas in the earlier system a number of pairs of small images was produced by a honeycomb of lenses and magnified by the mirror, in the French system one pair only of images, for the right and left eyes, is projected (Fig. 1) to *E*, below the large mirror *M*. The images for the various rows of patrons are reflected off a corresponding number of small mirrors,

A, back to the large mirror, *M*, and then to the audience. In the model demonstrated, the mirror measured only 36 wide by 8

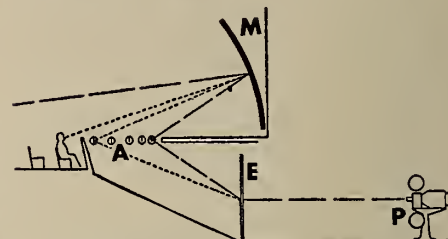


FIG. 1. French proposal for stereoscopy.

inches high, and had a focal length of 6 feet, 8 inches.

Alternation of Images

The film was composed of alternate right and left images, and, to direct these to the correct eyes of each patron, each of the small mirrors, *A*, was surrounded by a drum shutter, which obturated alternately the left and right images. The eyes thus saw actually their respective images, not together, but alternately. Notwithstanding the views of the inventor, I much fear that any system depending upon the projection of alternate right and left images must give rise to flicker and eyestrain.

I remember, when I first described the earlier system, expressing the view that for stereoscopic projection a mirror was preferable to a screen, on the psychological grounds that one looks *at* a screen but *into* a mirror. Surely it should be possible to overcome the defect of intermittency and still permit the right and left images to be correctly separated?

Intermittently-Flashed Arc

An interesting suggestion made in the German paper, *Bild und Ton*, is that an arc should be maintained at a low current of about 15 amps., and should be fed with impulses at about 200 amps. during the projection period of the picture, the pulses being so short as to immobilize the image from a continuously-moving film.

The pulses could be produced by the discharge of a condenser; an obvious advantage in that, since the condenser is being continuously charged, the load on the mains is much reduced.

Unsurmountable Flicker Problem?

There is, of course, the problem of flicker: to avoid it, it would be necessary to illuminate each frame of film twice, as with the ordinary projector shutter. Here is where the German proposal becomes less practicable: it is proposed that the continuously-running film should have every frame printed twice and thus should be double the normal length. The arc would, of course, flash at the rate of 48 cycles per second. It is pointed out that the sound track, being double the length, would provide an improved high-frequency reproduction.

An alternative suggestion is that a device on the projector should produce a double projection of each frame. This, of course, is the principle of an editing head made by Scophony-Baird, in which a flashing lamp illuminates each frame twice, a moving mirror compensating for the film movement.

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Uniform Depth of Focus?

A few years ago there was a spate of inventions in the cinema world which aimed at getting everything in equally sharp focus in all parts of the screen at the same time. Now, I cannot see that from any angle how this is advantageous. To start with, our eyes don't work like that. They move continually to accept or reject what they want, and they have quite a slight depth of focus, focusing sharply only on the thing that is actually being looked at.

But just because they are so automatically adaptable and shift their focus so easily, people don't realize this unless they take the trouble to verify it.

Differential Focus Effect

I have a pet theory that in all photographs no near object, especially a large one, should be out of focus, for two reasons: first, because it is bound to be dominant, and second, because in differential focus of any kind the difference in unsharpness is much more marked between two comparatively near objects than between two that are farther away, and the eye feels this even more than the reality justifies.

Just try taking a portrait in front of a background with some marked texture on it, and make two exposures, one in which the background is sharp and the face slightly out, and another in which the focus is too near and both the face (slightly) and the background (more) are out of focus. I'm willing to bet that the second one will be far more tolerable than the first, though the actual diffusion in both the faces is the same.

A similar experiment can be tried with three matchboxes or other small objects, arranged *en echelon* with a couple of inches between each. At a fairly wide aperture make an exposure first with the focus on the nearest one, then another focused on the center one, and last with the back one sharp. Then make a print from each, and I have not the slightest doubt that the first will be the only tolerable one. Either of these experiments, or others of a similar kind, are worth doing as they give an excellent lesson on the effects of differential focusing, an art which seems to have lapsed somewhat.—By "The Onlooker," BRITISH JOURNAL OF PHOTOGRAPHY.

Eastman Kodak 6-Months' Earnings Up

Eastman Kodak's net earnings for the first half (24 weeks) of this year were \$26,162,882, or \$1.90 per common share. This compared with \$21,646,085, or \$1.65 a share, for the corresponding time in 1949. Sales were \$181,665,329 against \$179,876,082 in the 1949 period.

Cine-Kodak film for amateur motion pictures ended the half year with sales still below the 1949 level. Sales improved, however, from a decline in the first quarter and

have continued this rise steadily in recent weeks. Film for the professional motion picture field, however, sold slightly better in 1950 than in the first half of 1949. A growing proportion of this professional film is being produced with the new acetate safety base and is being well received. By the end of 1950 all Kodak professional motion picture film for domestic use will be safety.

68th SMPTE Meet at Lake Placid

The 68th Semi-Annual Convention of the Society of Motion Picture & Television Engineers will be held at the Lake Placid (N. Y.) Club from Oct. 16 to 20 inclusive. More than 50 technical papers and committee reports, mostly dealing with Tv and the recording aspects of the visual art, are already scheduled. IP will present a report on the one or two papers which relate to the reproduction of sound motion pictures in theaters.

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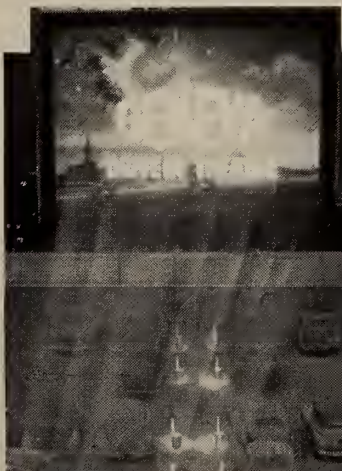
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BOOK REVIEWS

PRACTICAL TELEVISION ENGINEERING, by Scott Helt. 708 pages, profusely illustrated, index, appendices, including glossary. Cloth binding. Murray Hill Books, 232 Madison Ave., N. Y. Price: \$7.50.

Here is a sound and detailed engineering treatment of television, fully acquainting all workers in the art—commercial as well as technical—with all components of Tv transmitting and receiving, how they work, and how they are combined in the complete Tv system.

Transmitting and broadcasting problems of Tv are emphasized, in a thoroughly and

plainly written treatment that covers both the theoretical and practical aspects of lenses, lighting, cathode-ray tubes, oscillographs, camera tubes, synchronizing generators, video amplifiers, regulated power supplies, Tv receivers and transmitters, etc., as well as broadcasting techniques.

The book is based on an extended and practical field experience in installing and operating modern types of studio and transmitting equipment. It explains fully the circuits, construction, performance, etc., of all parts of the Tv system.

PRINCIPLES OF COLOR SENSITOMETRY: A compendium of papers on various aspects of this topic by a Committee of the Society of Motion Picture & Television Engineers. 72 pages, illustrated. Price \$1 on order to the Society at 342 Madison Avenue, N. Y. City 17.

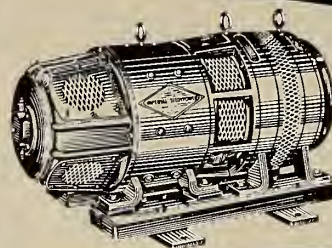
Here is a basic text just released by the SMPTE to cover for the first time this science which is basic to color motion pictures. It deals at length with the instruments available for use in color research and for quality control in practical use of color processes now enjoying commercial success. The practical achievement of photography in natural color as compared with theoretical possibilities and the areas where further research is required are stated with great competence.

Technical knowledge and guidance provided by this text, a cooperative committee production, will be helpful to the motion picture industry, as well as to color television, still photography in natural color, and in the graphic arts. It forms a foundation for development of common language among the users of color film and will help guide industrial practices during future years in the direction of standardization of many aspects of color sensitometry.

In its 72 pages, this booklet contains sections on: Sensitometric Exposures; The Processing of Sensitometric Tests; Quantitative Evaluation of the Image; Densitometer Design Principles; Transformations Between Integral and Analytical Densities; Interpretation of Sensitometric Results; Statistical Aspects of Color Sensitometry, and References.

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UNIFORM SCREEN LIGHT DISTRIBUTION

(Continued from page 14)

become farther away from the focal point (crater) than the center portion. It is obvious, therefore, that *spherical aberration* is a fault inherent in a mirror due to its spherical shape, and this condition prevails *even if the object (crater) be no bigger than a point.*

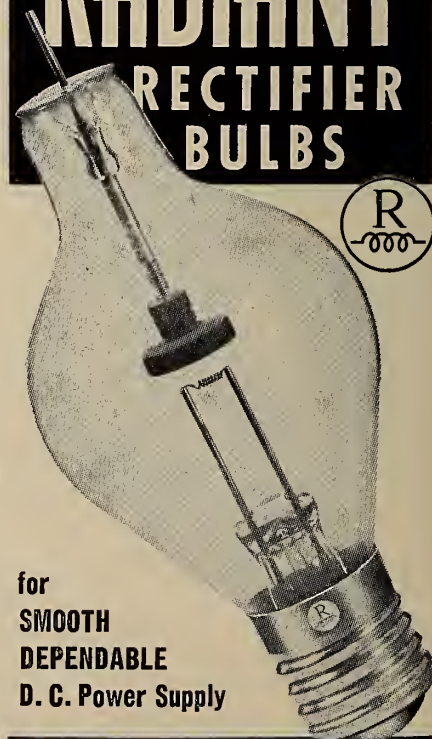
Dr. Gretener is not referring to *spherical* aberration when he states: "... the reflecting surface was given a curvature providing, instead of the conventional two focal points, two focal circles at two focal planes ..."

Anent Conjugate Foci

This reference is to what is known as *conjugate foci*. An optical (concave) mirror has two focal points on the optical axis known as *conjugate foci* or inter-related points of focus. A luminous object placed at one focal point will be reproduced as an image on the second focal point.

In projection, a light source (crater) placed a few inches in front of the mirror is reproduced as an enlarged image on the projector aperture. Therefore, one point on the optical axis situated in the

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plane of the crater, and the other point on the same optical axis situated in the plane of the aperture, are a pair of *conjugate foci*. The two points of focus are interrelated so that when one is moved *toward* the mirror, the second point is moved *away* from the mirror, and *vice versa*.

In optical discussions, the *conjugate foci* are thought of as very minute points (1/200 inch in diameter). When tracing

light rays from a lens or a mirror, an upright arrow (object) is placed at one focal point above the axis. When drawing lines representing a diverging light beam from the object (arrow) to the mirror, the reflecting rays can be traced to the second focal point to form an inverted arrow (image) below the axis.

Theoretically, when the object (crater) occupying a space larger than a point is placed at one focal point, it should focus sharply and build up an undistorted image at the other focal point.

Various Other Abberations

In practice, many other aberrations are present which interfere with perfect reproduction: *astigmatism, coma, barrel distortion, curvature of field, chromatic aberration* and, of course, *spherical aberration*.

It is obvious that Dr. Gretener's statement aforementioned refers to *curvature of field*, which means that the reflector is corrected for flatness of field, in addition, of course, to correction for *spherical aberration*. In other words, the light source which is disc-shaped is reproduced correctly and very sharply as a magnified disc on the aperture.

As to Mr. Ziller's final query, I should say "No". In our systems for projection no other correction than for *spherical aberration* is desired (for mirrors). Even *spherical aberration* to a small degree is desirable (F. H. Richardson would not like this) because all these aberrations and distortions, when present to a not

excessive degree, help to smooth out some defects inherent in the light source itself.

Typical Practical Problems

For example: with a low-intensity lamp a soft core carbon having a very deep crater, if accurately imaged on the aperture it may reproduce on the screen like a "ghost," meaning a dark area in the center of the screen. With a revolving arc in a high-intensity lamp, if imaged very sharply on the aperture it may show on the screen a trace of the movement of the arc.

What these various corrections do for Ventarc—why they are necessary and how they are accomplished—I am unable to say because this arc is truly a "new concept" with which I am not familiar, and Dr. Gretener does not say.

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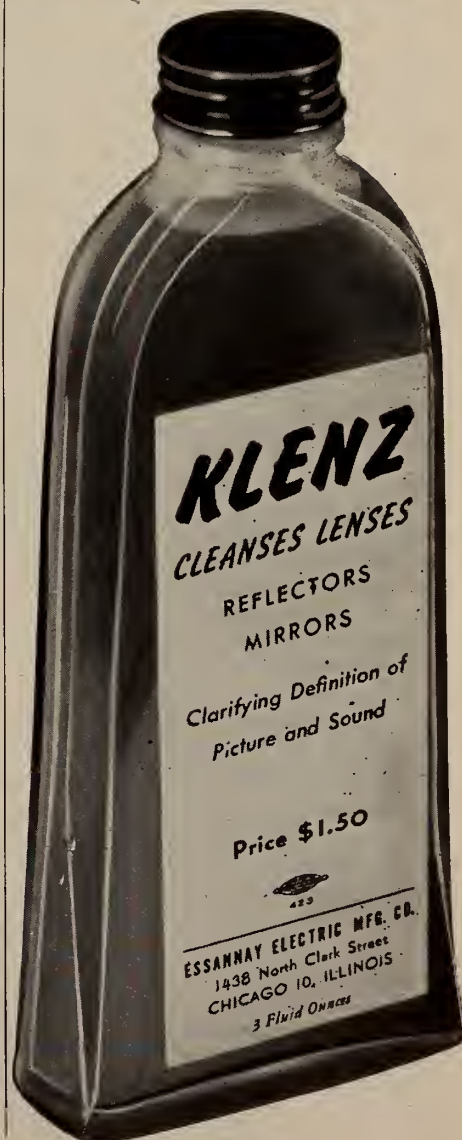
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MINIMIZING FLICKER IN PROJECTION

(Continued from page 6)

expensive, unfortunately—may be used to filter the trouble-causing ripple from the lamp circuit.

It is believed by competent authorities that a 60-cycle component in the arc current greater than 0.15% will cause a visible 12-cycle flicker in the screen illumination when the projector is running at normal speed.**

Instability of the Arc

Irregularly pulsating arc illumination gives rise to very bad flicker. Diagnosis of this condition is not difficult, as the immediate cause is an unstable arc. The projectionist should first make sure that the arc current is correct, that the carbons are not cracked or damp, and that the arc gap is of the proper length. If flickering of the arc persists, drafts or magnetic disturbances are probably causing the trouble.

In the case of low-intensity lamps, drafts cool the white-hot crater of the positive carbon, both directly and by causing the arc stream to waver, varying the current. The result is flicker on the screen. The best remedy is an overhaul of the lamp ventilation system. In an emergency, employ as little ventilation as is absolutely necessary to carry off the arc gases.

Ventilation Without Drafts

High-intensity arcs are peculiarly sensitive to drafts. Most of the light-output produced by these arcs comes from the ionized gas ball held in the deep positive crater by magnetic fields. Drafts disturb this ball of luminous gas, causing it to change its position, or even to vanish altogether in the tail-flame.

Because the gases evolved by h-i arcs are considerably more hazardous to health than l-i arc gases, good ventilation must be provided at all times. Heat-resistant glass placed over the light-cone or spot-glass case of the head in most cases prevents arc-disturbing drafts from entering the lamphouse. Down-drafts in the ventilating system are ruinous to good projection.

Stray Magnetic Fields

Stray magnetic fields inside the lamp-house act upon the arc exactly like gusts of air. Because such fields need not be variable to disturb the smooth burning of the carbons, incorrect arc-magnet field strength may be responsible in the case of simplified h-i lamps. A magnetized screwdriver or other object of ferrous metal carelessly left inside the lamp-house has been known to produce flicker-

ing light in both simplified and rotating-positive h-i arcs.

It is always possible for flicker to be present in the film, itself, and thus beyond the projectionist's control. Film flicker is due to variations in the density of the printed image, and is independent of worn perforations and other defects which may cause an unsteady screen image. Picture "jump" and flicker are two entirely different defects.

Picture 'Jump' vs. Flicker

Some of the early writers on projection failed to make this distinction. In certain old textbooks we encounter such statements as: "If the film perforations are irregularly placed, flickering will ensue." "The presence of flicker indicates bad perforations." "The absence of flicker is largely dependent on the operation of the intermittent movement." All of these statements are false. Irregularities in the film perforations and in the action of the intermittent movement will introduce *unsteadiness* of the projected picture, but not *flicker*.

A determination of the exact cause of film flicker is beyond the province of the projectionist. In fact, it is impossible to determine the cause of this defect by examining a single sample of film. The most we can do is eliminate the possibility of faulty studio lighting on outdoor "long shots."

Most of the evidence at hand indicates that severe film flicker arises not in the manufacture of the raw stock but in the

processing of the film. In certain cases trouble has been traced to accidental variations in printing exposure; and in a larger number of instances rush-order developing has spoiled the quality of prints.

The fact that the prints issued by the better processing laboratories are consistently good is sufficient indication that the raw stock used is seldom, if ever, at fault.

Ewald Boecking, Inventor

Ewald Boecking, inventor and mechanical engineer with a record of high accomplishment in the motion picture projection field, died at his home in Staten Island, N. Y. on Aug. 18 last. He was 56 years old.

A native of Germany, Mr. Boecking came to America in 1927 and almost immediately entered the motion picture engineering field. Scores of patents relating to the Simplex Super and E-7 projectors bear his name, as did a patent relating to a "flickerless" projector which could be operated on either a-c or d-c. He also developed a driving and synchronizing mechanism for projectors.

During the war years Mr. Boecking did development work on the Norden bomb-sight, being at the time on a leave of absence from Century Projector Corp., with which he was associated at the time of his death. There is general agreement among qualified technicians that Mr. Boecking exemplified the finest traditions of his art.

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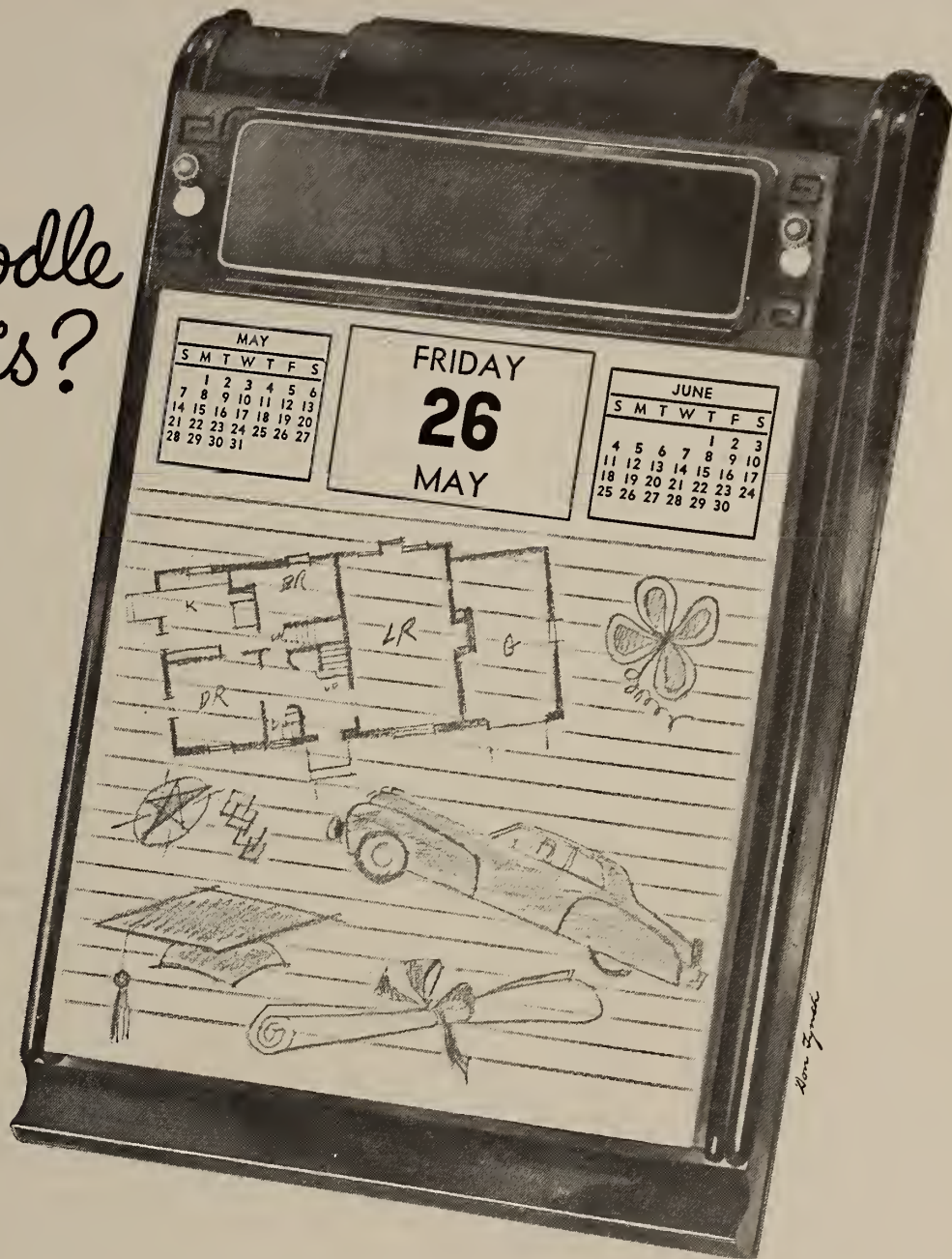
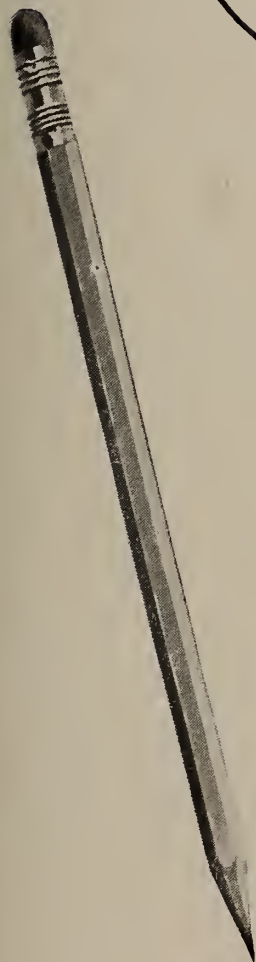
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** See "Flicker in Motion Pictures," by Loren D. Grignon: I.P. for January 1949, p. 17.

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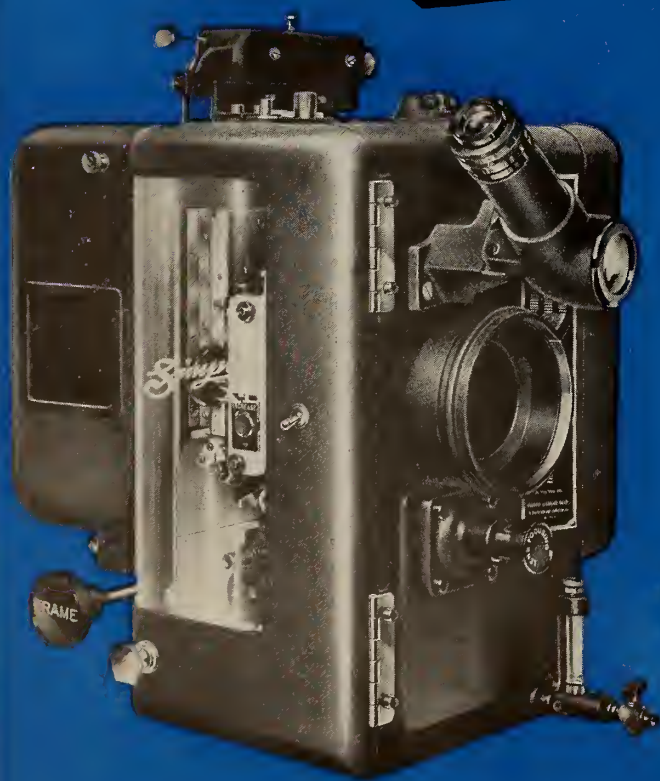
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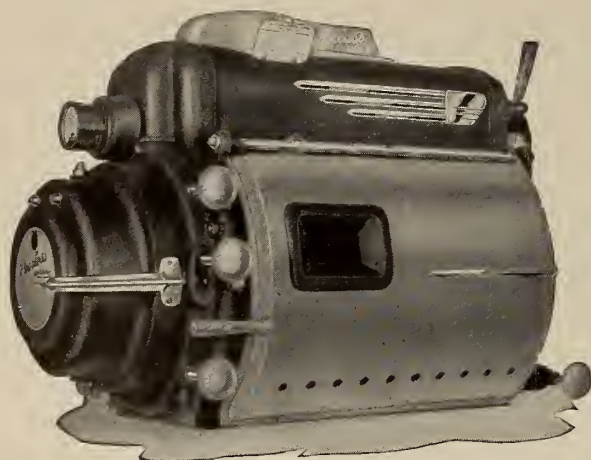
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OCTOBER 1950

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420

MONTHLY CHAT

SO MANY variables affecting so many diverse units of equipment and involving various physical laws enter into the process of motion picture projection, particularly in the professional field, that a few minutes reflection will occasion no little wonder that the technical forces in the industry have scored as many gains as they have. Mechanics, optics, chemistry—to name only a few—are subjected to the craftsmanship of studio, laboratory and theater technicians to achieve a result which, over-all, remains one of the modern technological wonders of the age—the motion picture.

All this was impressed upon us during a recent discussion with Dr. W. W. Lozier, chairman of the SMPTE Screen Brightness Committee, which is now conducting a survey of screen brightness in a representative number of theaters in key distributing centers.

Pointing out to Dr. Lozier that the survey was to emphasize (a) incident light on the screen, and (b) reflected light, both of which factors were to be determined by meter readings, we suggested that these findings could not be conclusive in that they would not include data on (a) the type of screen and its ability, whether due to original design or to age, to project an acceptable image, and (b) the quality of the image in terms of color balance, flicker content, and light distribution.

Dr. Lozier stated that the survey would take account of distribution of light intensity over the screen, and that the reflected light measurements would indicate the reflection factor of the screen. Granting that the question of flicker content was of extreme importance in evaluating a screen image, Dr. Lozier admitted ruefully that there did not exist at the present time any satisfactory method for evaluating this factor, but that he was hopeful that something constructive could be accomplished in this direction in the not too distant future.

Which brings us back *via* a circuitous route to our starting point and emphasizes anew that nothing less than perfection in every step of the production process and in every unit of equipment down to a single last factor—an improper shutter blade, a screen, or what have you—is required for tip-top projection.

So, before we preen ourselves on the score of present-day projection having been reduced to an "automatic process" by the irresistible onward march of technical savvy, let us humbly remember that we still are the servants of a tough boss who is compounded of intangibles which, if not recognized and favored, can reduce to a puny, meaningless stature all those towering monuments we have been so busily erecting to our own self-importance.

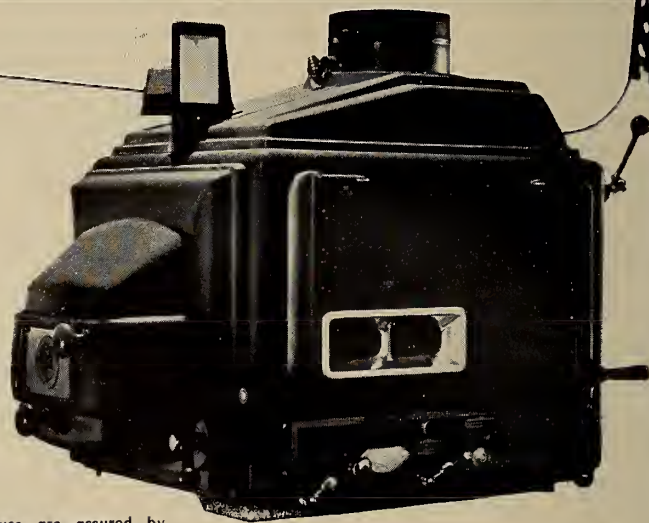


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L-I Arcs: Horse-And-Buggy Projection

IT IS absurd to think that any exhibitor would issue a pair of dark glasses with each admission ticket. And yet, such a practice is, figuratively, being followed by every theater owner who still uses the old-fashioned low-intensity, reflector-type arc lamps of the 1920's. In spite of the progress that has been made in carbon arc engineering and the great amount of publicity that has been given to these advances, there are those who still use obsolete equipment and must be reminded again of the benefits of modernization.

The motion picture of today cannot be projected adequately with the low-intensity lighting of 25 years ago. Few would even try to argue this point for color projection, and it is equally true for black-and-white. Replacement by the simplified high-intensity arc is, therefore, definitely indicated. Simplified high-intensity projection gives two to three times as much light on the screen and the cost per unit is so much less than low-intensity that almost every theater owner can afford to have projection that is as good as that in the biggest theater. The theater owner has only one thing to sell—picture quality as projected on the screen.

The phenomenal strides that have been made by the motion picture industry in the arts of production and processing and, finally, the prevalence of color, have long since placed demands on the equally important art of projecting the picture to get out of the film the superlative qualities that were put into it.

Low-intensity projection is outdated, uneconomical and unsatisfactory to patrons. Audiences get around. They become familiar with the difference in picture quality and subconsciously compare the quality of projection in big deluxe houses with that in the smaller theater.

High quality projection is within the range, *on a cost basis*, of every theater in the United States.

The Process of Seeing

Seeing is not quite effortless even with daylight intensities. It takes more light to read a newspaper than it does to read the large type on a billboard at the side of the road. Indoor seeing, such as viewing motion pictures, calls for sustained attention and focusing of the eye. Screen illumination, therefore, should be ample to provide comfortable vision even for those people whose eyes are defective. And remember, 60% of all eyes are defective. Details of motion pictures that are large enough to be seen easily from the front row of seats are smaller from the back row and, therefore, require more light to be seen there with equal ease. There may be a reason for those vacant seats at the back of the house.

In order to see, the eye must scan or move across the visual field, taking in only a small part of it at a time, so rapidly

ly that we are not conscious of it. In the case of motion pictures, the visual field presented by one frame on the picture screen cannot be scanned entirely in the fraction of a second that it remains on the screen. The more light, however, the quicker the eye can scan and see enough of each frame to be able to follow the sequence.

Increased light (screen brightness) can make a 3-to-1 change in the size factor and a 4-to-1 change in the speed factor of seeing. More light offsets the smaller picture size as seen from the rear seats, so that more light enables those farthest away to see and follow the action on the screen fast enough to get the story as easily as they should.

Motion pictures projected at 90 feet per minute, or $1\frac{1}{2}$ feet per second, allow only $1/24$ th second per frame. If only one frame were projected at this speed, the details would not be seen clearly. It is only because the successive frames are so nearly alike that we can distinguish the details of moving pictures at all. But the faster the action, the more the successive frames differ and the harder it is to see the action. The only possible compensation is more light to enable the eye to see at its fastest speed. The golden rule of picture projection must be light enough for the poorest and slowest eyes in the audience. In other words, *greater screen brightness*.

Importance of Brightness

The amount of light required at the aperture plate of the projector has steadily increased until, at the present time, only the high-intensity arc can furnish the light concentration necessary to satisfy the high technical demands of modern projection. In addition, it must be remembered that the most important reason for the tremendous concentration of light is that the picture aperture com-

Here We Go Again

An ominous note which will have a strong echo in the motion picture projection field was sounded on Oct. 5 when the National Production Authority announced that some critical defense materials, *notably* aluminum, copper and brass, are "likely to fall under allocation within two to three months."

Copper and aluminum are two materials widely used in the projection field, the former for carbons and the latter being employed extensively in the manufacturing field. It is likely that projectionist aid will again be enlisted to save copper drippings from carbons, as a conservation measure; but it is hoped that the program this time will be conducted a bit more efficiently so that its full potentialities may be realized.

pare in size with a postage stamp.

The same amount of light that gives one foot-candle per square foot, at one foot from the source, must cover 16 square feet at four feet from the source. With a 100-foot throw, the light from the projector is reduced at the screen to 1/10,000th of its intensity at one foot from the projector lens. That is, all the light that gets to the screen must go through an aperture having an area only 1/85,000th as great as the area of a 15- by 20-foot screen.

Brightness is the effect in the eye which light produces. Light is the agent which excites the process which results in vision. What we see is an illuminated surface, such as the picture screen, and we see it because of the light reflected back to the eye. Brightness is measured by a unit called the "foot-lambert." A square foot of surface receiving one lumen (total light output per square unit of surface) of light would have a brightness of one foot lambert if the surface reflects 100%. But, as motion picture screens at best absorb 20 to 25% of the light received, each lumen of projected light per square foot produces only 0.75 or 0.80 of a foot-lambert. Recommended screen brightness of 9 to 14 lamberts means from 12 to 18.7 lumens per square foot of screen.

B-&W vs. Color Projection

The black-and-white motion picture, being a pattern made up of white, gray and black areas, reflects differing amounts of light. Most of the reflected pattern is gray, and unless the projected light is adequate, the grays merge with the blacks and detail is lost as it is in silhouette. Projection light should be strong enough to bring out the contrast between the various tones of gray.

With color pictures, an intense light is necessary for proper color separation in the projected image. Poor illumination and the resulting faulty simultaneous contrast will deteriorate the reproduction of color on the screen. Relative decrease of brilliancy of yellow or orange hues from the center towards the sides will make them appear brown; and green, if reproduced with reduced intensity with respect to the other color

components, will appear olive. The surest way to get the full patronage value of color pictures in the small theater is with high-intensity carbon arc projection.

More Light at Less Cost

The only possible means of getting more light on the screen is to get more light through the projector aperture. Simplified high-intensity projection, due to the "Suprex" carbons and improvements in the lamps designed for their use, utilizes more of the electric energy for the production of light than the low-intensity carbons and their lamp systems. This point is important because it explains why high-intensity projection gives two or three times as much light on the screen without using two or three times as much current. Though more units of light are produced the cost per unit is less.

To illustrate, if an index of 100% is set for the relative cost per hour per 1000 screen lumens for the very early d.c. low-intensity condenser type lamp and trim, then the low-intensity reflector type would be 24-32%, while the simplified d.c. high-intensity arc with an F:2.0 treated lens would be only 11%.

Quality of Light Controlling

Color motion pictures are more sensitive to *quality* of light than they are to *intensity*. Only a snow-white light, composed of an even balance of colors, can make colored objects visible in accurate hue. For example, flesh tones are a blend of many colors: if viewed in a light that is weak in some of those colors, the natural appearance is lost. An illustration of this, which everyone has observed, is the appearance of the hands and face under mercury arc lighting. This color accuracy will reach the screen and the eyes of the audience only when projected by light of snow-white quality.

Simplified high-intensity projection gives color accuracy because it has this snow-white quality. The superior color balance of the light from its high-intensity arc accounts for the difference between its reproduction of true, life-like color fidelity and the comparatively dim, faded off-tone picture produced by the relatively yellowish light from the low-intensity arc.

L-I vs. H-I Light Quality, Quantity

The low-intensity reflector arc has two serious shortcomings from the viewpoint of present-day projection requirements. These are the *quality* of light and the *total volume* of screen light available. The light from the low-intensity arc, even at maximum brilliancy, is somewhat yellowish.

Furthermore, the optics of projection place certain limitations on the size of the light source that can be effectively used. When these limits are reached for a given optical system, there is no way

RELATIVE COSTS OF OPERATION

Lamp Type, Carbon Trim	Cost per Hour per 1000 Screen Lumens (per cent)
Early D.C., L-I condenser-type	100
Later D.C., L-I condenser-type	72
L-I D.C., reflector-type	24
D.C. simplified H-I...	11
One-kilowatt H-I	10.5

to obtain more light except by increasing the brilliancy of the source. The low-intensity carbon arc is inherently limited to a brilliancy of about 175 candlepower per square millimeter by the vaporizing temperature of the carbon. When this maximum brilliancy is attained over as large an area of the crater as the optical system will utilize, the full possibilities of the low-intensity arc are realized.

Extension of the field of high-intensity arcs to theaters of small and intermediate size was accomplished by the development of the small-diameter, copper-coated, high-intensity carbons known by the trademark "Suprex." The lamps in which these carbons are used are of the non-rotating reflector type and use small-diameter, copper-coated carbons. They are very simple in design.

New Negative Did the Trick

Use of a new negative carbon which permitted operation of the high-intensity arc at lower voltage than previously was practicable resulted in the availability of the "one kilowatt" high-intensity arc. These lamps are similar in design and performance to the simplified high-intensity lamps. With this development, snow-white projection light and a high level of screen illumination was made available to theaters of every size, down to the smallest neighborhood house.

The high-intensity carbon arc uses certain rare earth materials in the core of the carbon, and by maintaining the relative position of the two carbons within rather sharply defined limits, the crater face assumes a cup-like form within which the vapors of the carbon and core material appear to be restrained and raised to a temperature much higher than the boiling point of carbon. The result is a light of great brilliancy.

The ease of changeover and the savings in operating costs, combined with the "patronage factor" of larger, more satisfied audiences, are reasons enough why the owner of even the smallest theater should avail himself of the opportunity to put the quality of his projection and screen illumination on a par with the highest standards of the industry by changing over to modern simplified high-intensity projection.

BRIGHTNESS OF VARIOUS TYPES OF PROJECTOR CARBON ARCS

Type of Arc	Candles/Mm ²
Positive crater center	
brightness D.C., L-I arc..	175
70-amp. Suprex D.C. arc...	700
150-amp. D.C., H-I arc.....	860
170-amp. D.C. super H-I arc	940
D.C., H-I arc	
(experimental)	2000+
Sun at zenith	1650

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THE PROJECTIONIST'S PROJECTOR

Designed, engineered and built by projection specialists, the Motiograph Model "AA" Double Shutter Projector is recognized as the world's finest—the proven projector that can be guaranteed for a full year. It comprises all those features which projectionists consider necessary for dependable performance, simple, trouble-free operation and ease of maintenance.

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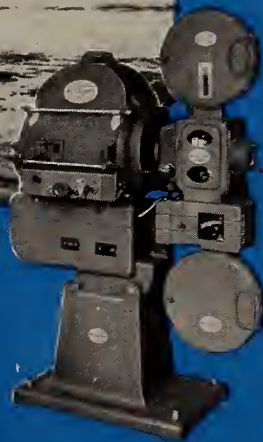
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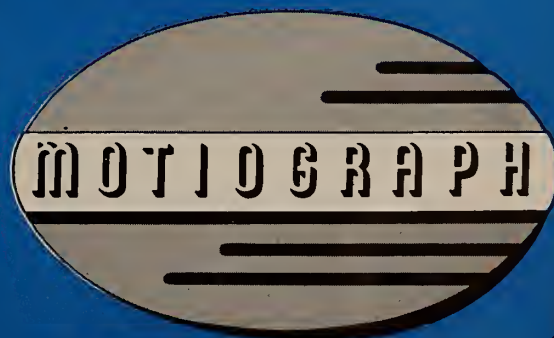
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Process Projection of Film for Tv

By R. A. LYNN and E. P. BERTERO
Engineering Staff, National Broadcasting Company

A 3-2 system projector was tried for background purposes. As expected, it was compatible with the regular studio camera; however, as was predicted, there was insufficient illumination on the screen for viewing purposes. It was predicted that pull-down would have to be extremely rapid, otherwise flicker effects would be observed in various parts of the picture, depending on the phasing of the shutter.

Several manufacturers were approached with this problem. Holmes Projector Co. had already developed the mechanism for rapid film pull-down. The principle of the 3-2 intermittent had already been established. A new five-bladed shutter, shown here, was designed to rotate at 720 r.p.m.*

The Holmes Co. cooperated with NBC and fabricated a prototype unit containing the various features thought to be desirable for background projection work. Tests of this unit showed that the basic plans were correct.

Dual Projection Lighting

The projector includes both carbon arc and incandescent light sources. The arc is a standard type known to the industry as the Strong Junior High-Intensity Arc with a normal rating of 30 amperes at 27 volts. A rectifier is supplied to give the necessary d.c. The arc can be removed and the incandescent lamp-house quickly dropped in place when a smaller picture is required.

Since it is required that these projectors operate in studios containing active program microphones, particular attention was given to noise reduction. The film pull-down was designed to be as quiet as possible, and the main driving motor was mounted on rubber driving via a toothed rubber drive belt.

Extremely short focal length lenses are not readily obtainable in the field of motion picture projection. However, Bausch and Lomb recently made available a 20-mm lens which has suitable characteristics. The throw distance required to fill the 9 x 12-foot screen is 18 feet.

Approval by Municipal Authorities

When equipment such as a film projector utilizing a carbon arc is used in a studio in New York City, various departments have regulations which must be satisfied before the equipment may be operated. Three of these departments are Water, Gas and Electricity; Building and Housing, and the Fire Department.

* See line drawings on pp. 16 and 17 of IP for last month (Sept. 1950).

Although non-combustible 16-mm film is used, it is necessary to exhaust the arc vapors either to the outside atmosphere or else through a water bath. Since projector mobility is important, it was decided to exhaust through water. The moving elements of the machinery are not noiseless, so it was necessary to enclose the entire apparatus in a mobile booth containing sound-deadening treatment. The previously mentioned regulations dictated the type material used in the construction of the booth.

Projector Construction, Weight

The projector booth, with the attendant projectionist weighs about 550 pounds and requires a substantial dolly to prevent beam disturbance. The first dolly used by NBC was made of angle iron with boiler plate as the platform. Transite side walls and roof, plus soundproofing, brought the overall weight up to one ton! To cut down on this weight, new plans called for a wooden sub-structure completely covered with Transite to comply with fire regulations. Aluminum instead of iron angle will reduce the weight to 1300 pounds.

The accompanying illustration shows the projector within the booth. Construction is Fire Underwriter-approved. This booth is 50 x 72 x 72 inches and rests on a dolly 6 inches above the floor. Soundproofing consists of 2 inches of fibre glass covered with a glass cloth retaining screen.

Two projection windows have been cut in the booth, one straight ahead which is used when image reversal is not important and sufficient throw distance is available. The second window, located in the side, is used in conjunction with a mirror which is mounted as part of the projector. This mirror gives a reversed image on the screen when viewed by the projectionist. However, a correct image is viewed by the television camera from the far side of the screen.

Exhausting Arclamp Fumes

A suction blower located within the booth exhausts the arc house fumes into a receptacle holding swirling water. After emerging from the water bath the exhaust air is conducted to the outside of the booth through a muffler.

Two blowers are located within the

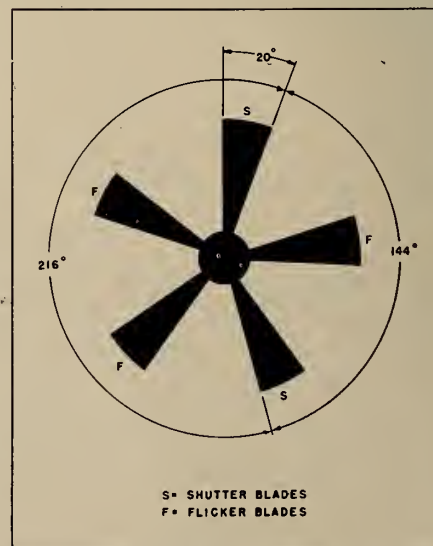
booth, for air circulation. Also provided are a film rewind and splicer, loop holder, intercom set, working lamp for general illumination purposes, power input receptacles, rope for moving the booth, and screw jacks on the four corners of the dolly to lift the booth off the casters, thus making it completely static.

One problem was to construct this booth so that it would pass through any studio doors—which are 6 feet, 7 inches high. This necessitated low headroom within the booth, and consequently for maximum comfort the projectionist should not exceed 5 feet, 10 inches in height.

For pictures from 4 x 5 feet up to 5 x 7 feet the arc is not required and use is made of the 1000-watt incandescent lamp. When used on shows on a daily basis, their requirements can be met by assigning a light-weight type of motion picture background projector. The deletion of the arc house, rectifier and water bath permits the unit to be compact and portable. Furthermore, in those cases where a broadcast control booth with a glass window is available, the projector can be used therein, eliminating the need for sound insulation.

In general, two types of screens are available for background projection. The "white" screen has a light trans-

(Continued on page 33)



Five-bladed shutter revolves at 720 r.p.m., uses three blades to eliminate flicker.



Architect for castles—and cottages...

FROM blueprint to model to full-size structure—so grew this “dream castle”—product of the set designer’s skill.

As architect for filmdom’s castles and cottages, he heightens dramatic effect by his creative work with materials and textures. His sets help establish and maintain story mood... give camera and actors the freedom needed to do full justice to the scene.

For this he must be more than master architect: he must have real understanding of the photographic element in which his sets will “live.”

And from his close association with the camera art, he knows how much creative latitude depends on the proper films. Films with the versatility for which the Eastman motion picture family has long been famous.

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The Strong Trouper assures a knife-sharp, steady, uniformly brilliant, dazzling snow-white spot. It draws only 10 amperes from any 110-volt A.C. convenience outlet.

It's easy to operate. The automatic arc control maintains a constant arc gap, free from hiss or flicker. A trim of carbons burns one hour and twenty minutes at 21 volts and 45 amperes.

It makes the use of heavy rotating equipment unnecessary. The adjustable, self-regulating transformer is an integral part of the base. The Strong Trouper is mounted on casters. It is easily disassembled for shipping.

A horizontal masking control can be angled at 45 degrees in each direction. A color boomerang contains six slides and an ultraviolet filter holder.

The optical system utilizes a silvered glass reflector and a two-element variable focal length lens system.

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Projector Shutters: A Symposium

By R. H. CRICKS

Technical Editor, "Ideal Kinema"

ONCE again I have to take up the cudgels on behalf of a British projector as opposed to the views expressed by Robert A. Mitchell in *INTERNATIONAL PROJECTIONIST*—although this time, it is true, it is on a somewhat trivial matter but one that merits correction.

In an article on projector design, Mr. Mitchell makes the statement that B.T.H. (British Thomson-Houston) claim as original the dished shutter used in their SUPA projector. I am sure that B.T.H. know as well as Mr. Mitchell that this type of shutter was used many years ago: Mr. Mitchell attributes it to pre-war European projector manufacturers; my own recollection surely goes back considerably farther—in fact, to the early Motiograph projector.

A feature that is claimed by B.T.H. to be original—and is, indeed, the subject of a patent—is the supplementary vane which Mr. Mitchell omits to mention but which principle is plainly shown in the sketches which must have been available to him as he wrote.

In the open position of the shutter the vane is parallel with the rays of light and casts no appreciable shadow. As the shutter turns, the vane intercepts more and more of the light. The effect of this vane is that the angle needed by the shutter to cut the beam is reduced from the 19 degrees possible with a plain 7-inch dished shutter to 14 degrees—this, of course, occurring four times per frame.

The dished shutter has the advantages over other high-efficiency shutters in needing no complicated gearing and in operating quite close to the aperture.

By FRED MATTHEWS

Motiograph, Inc.

MR. CRICKS' comments, flattering as they are to Motiograph's long history of enterprise in the projection field, are complimentary indeed. There have been many so-called comparative tests made to determine the light-transmission efficiency of various shutter assemblies. If some published results of such tests appear biased, one can always turn to Mr. Mitchell's articles for a

* "Notes on Modern Projector Design," (I, II, III) by R. A. Mitchell; IP for May, June, July, 1950.

† "Projector Shutters: Design, Performance," by R. A. Mitchell and Larry Davee; IP for August, 1950.

SPRINGBOARD FOR THE APPENDED HIGHLY INFORMATIVE SYMPOSIUM ON PROJECTOR SHUTTERS WAS PROVIDED BY THE RECEIPT FROM FRED C. MATTHEWS, OF MOTIOGRAPH, INC., OF A RECENT COMMENTARY BY R. H. CRICKS, TECHNICAL EDITOR OF *IDEAL KINEMA* (LONDON, ENGLAND), ANENT THE RECENT SERIES OF IP ARTICLES BY R. A. MITCHELL ON MODERN PROJECTOR DESIGN, WITH SPECIAL EMPHASIS UPON VARIOUS TYPES OF SHUTTERS.*† MR. CRICKS LEADS OFF, IS FOLLOWED BY MR. MATTHEWS, WITH LARRY DAVEE, OF CENTURY PROJECTOR, ROUNDING OUT THIS STIMULATING DISCUSSION.

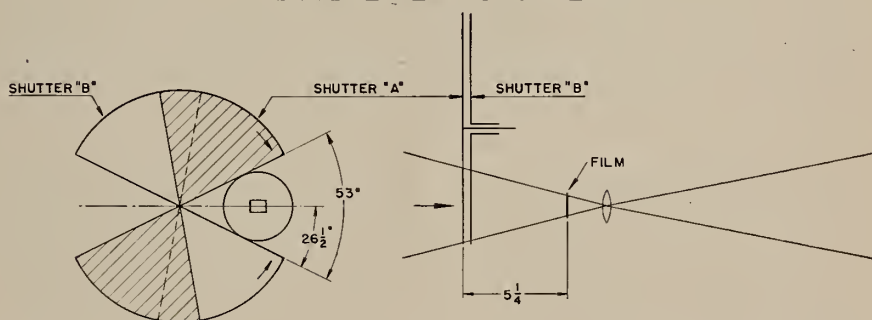
breath of fresh air in a murky atmosphere.

We feel that the Mitchell articles, in the main, are eminently fair to all concerned because of their objective quality, and the weight of our opinion in this respect runs to Motiograph's 54-years'

history of building production or experimental models of projectors using every known type of shutter in a wide variety of positions.

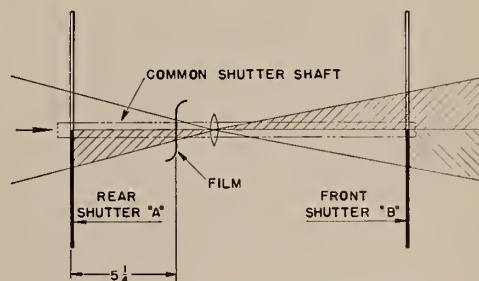
In 1908, Motiograph employed a small, single, rear conical shutter located almost flush with the aperture in our Opti-

DOUBLE REAR SHUTTERS

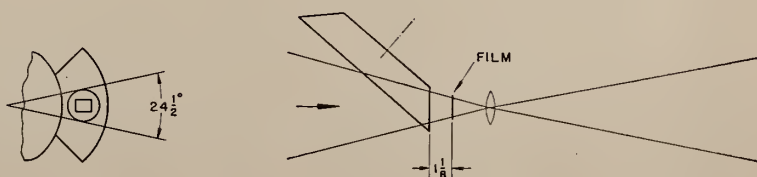


FRONT AND REAR SHUTTERS

RESULTING LIGHT CUT-OFF IS THE SAME AS SHOWN ABOVE SINCE THE LOWER HALF OF THE LIGHT BEAM IS CUT OFF BY THE REAR SHUTTER "A", AND THE UPPER HALF OF THE LIGHT BEAM, AFTER REVERSAL BY THE PROJECTION OPTIC, IS SIMULTANEOUSLY CUT OFF BY THE FRONT SHUTTER "B".



SINGLE, REAR, CONICAL SHUTTER



The accompanying discussion of projector shutters provides a welcome opportunity to service the scores of requests received for IP for August, in which it originally appeared, which could not be honored due to the rapidity with which the supply of that issue was depleted.

graph Model No. 4. From 1910 to 1914 our Model 1A contained the first double-shutter produced. This model had two small conical shutters located very close to the aperture and moving in opposite directions. In 1912 we made our Model A with a single, 3-wing, large disc-type shutter located in front of the lens.

We employed a 2-wing, front-mounted, disc-type shutter in successive Models D, E, and F from 1916 to 1930. In 1929 we also made some Model F mechanisms with single, large, disc-type shutters located at the rear. In 1930, after several experimental models with large, disc-type shutters located at both the front and rear, we introduced the Model H mechanism with a cylindrical, barrel-type rear shutter. This same shutter, with some modifications, is used in our present-day Model AA mechanism.

To the Optigraph No. 4 of 1908 vintage, with its single, small conical shutter, is attributed excellent light-transmission qualities. The design of the present-day Motiograph AA mechanism was based on comparative tests as between the amount of light transmitted by these old Motiographs and by all the modern projectors. Unfortunately, an Optigraph No. 4 of 1908 was missing, but included was our 1A of 1910.

Cylindrical Shutter Preferred

In all of our tests we used a Mazda light mounted in an old Motiograph lamphouse securely locked into position, so we always had a steady light source equidistant from the aperture. The shutter blades of each mechanism were cut before tests were made to give the maximum possible light transmission without appreciable travel-ghost.

The tests clearly showed that the cylindrical shutter, a combination of the front- and rear-mounted, large, disc-type shutters and two rear, disc-type shutters, gave greater light transmission than a large, single, disc-type shutter, whether mounted at the rear or front. Incidentally, the variance in light transmission between the three types of double shutters was very small.

The Motiograph 1A, with its two rear, small, conical shutters, offered slightly more light transmission than any of the other three types of double-shutter mechanisms—which is in line with Mr. Mitchell's contention that small conical shutters positioned close to the aperture give maximum light transmission.

Factors Other Than Light

We recommend a projector mechanism with either a cylindrical shutter, double rear-shutters, or a small conical rear-shutter, rather than the outmoded single-disc shutter.

Projectors should *not* be selected from the standpoint of light transmission alone. It is far more important that the pro-

jector shutters be cut to give only such screen illumination as can be obtained without flicker or travel-ghost. For this reason, when we install Motiograph AA mechanisms in indoor theaters, we equip them with shutters that do not permit maximum light transmission.

Equally important in projector selection is its ability to produce a rock-steady, clearly-defined picture. It is to be remembered that the projector can't do the whole job: it is vital that the arc lamp, generator, lens and the screen be modern and of the correct size to meet the particular requirements of a given theater.

It follows, of course, that all equipment should be handled only by experienced projectionists.

By LARRY DAVEE
Century Projector Corporation

THE contribution of R. A. Mitchell to the discussion of projector shutters, together with certain optical data, in IP for August (p. 5) requires, we think, clarification by means of the appended commentary and its accompanying sketches. The latter will be familiar to anybody who has read the chapters in a physics book which explain how optics are utilized.

Even though a motion picture lens is complicated by several glass elements inserted for the purpose of correcting for *chromatic* and *spherical* aberration, it works exactly the same as a simple lens.

Figure 1, therefore, is a simple diagram showing how any one point A on an object ABC is focused by a lens to reproduce an image A' (A'B'C'). Fig. 2 represents the same process expanded to

show three principal points A, B, and C of object ABC focused by the lens to produce an image of those points A', B', and C' on image A' B' C'.

The 'Hourglass' Effect

Note in Fig. 2 that there is an apparent concentration of light where the various light rays cross each other to make a double cone of light shown by the dotted lines. It is this concentration of light (the "hourglass effect" mentioned by Mr. Mitchell) which is observed when "blowing cigarette smoke in front of the projector while in operation."

As a lens cannot select that object which it is supposed to focus, it necessarily focuses anything it sees. The distance of the image from the lens being dependent upon the distance of the object from the lens, objects placed in line of its "vision" are, therefore, focused at *different distances*.

Thus, as shown in Fig. 3, there is an image of the mirror formed by the same process as explained previously. Point Z on the mirror (XYZ) is focused by the lens to form an image point Z' on X' Y' Z'. Expanded as shown in Fig. 2, the complete mirror image is formed at A' B' C'. This "aerial" image may be observed "if a dark surface is interposed in this beam at this point."

Figure 4 shows the two independent objects with their corresponding images superimposed one atop the other. Note that the image of the mirror X' Y' Z' comes within the "hourglass" of the light but that it is independent of it and, for the purpose of shutter efficiency, has no relation to the screen image. The light

(Continued, foot of next page)

FIGURE 1

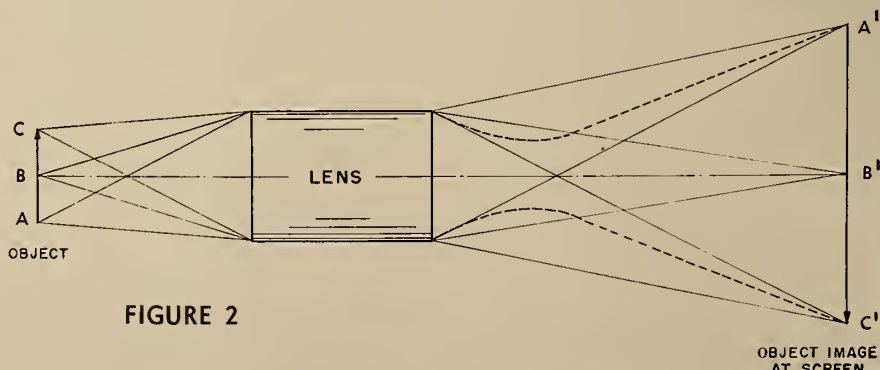
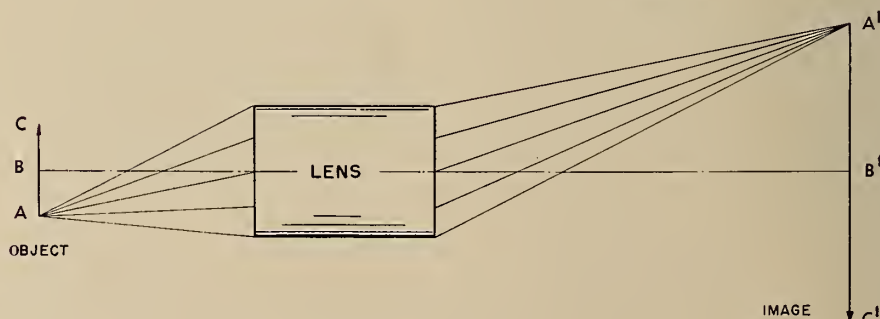


FIGURE 2

35-Mm Color Theater Release Prints From 16-Mm Kodachrome Originals

One of the most significant advances in production technique in many years, and one that augurs well for the entire film industry, is the color-duplicating process described in this article, which appeared originally in *American Cinematographer*.

RECENT ventures in filming motion pictures in 16-mm color, then blowing them up to 35-mm color for theatrical release have proven sufficiently successful to warrant increased activity in this field. Perhaps the earliest ventures of this kind began during the war when 16-mm Kodachrome shots of battle action in the Pacific and in Alaska were blown up to 35-mm. Technicolor for showing in the nation's theaters.

About the same time some of the major studios began to acquire 16-mm Kodachrome footage of interesting subject matter from independent cine photographers, which they enlarged to 35-mm

color and released as short subjects. The Technicolor sequences in Warner Brothers' "Task Force" were largely made up of 16-mm Kodachrome footage filmed during actual battles in the Pacific. Of the short subjects released during the last two years by three major studios, many originated in 16-mm Kodachrome.

Direct Color-Print Blowup

The technique for photographing 16-mm color films for subsequent enlargement to 35-mm color and for the production of such release prints continues to advance. Already much of the technical information has been recorded in a popu-

lar text book for cinematographers. Jackson J. Rose, A.S.C., has devoted a chapter to the subject in the new, revised edition of his *American Cinematographer Hand Book and Reference Guide*, as follows:

"During the last two years many producers have made feature-length films as well as short subjects on Eastman Kodak's 16-mm Commercial Kodachrome for release in theaters on 35-mm Ansco Color. The simplicity of this direct-Blow-up color print procedure, as developed by Filmeffects of Hollywood, combined with the economy of shooting three-color productions on a low-cost 16-mm original, makes this method highly attractive to producers who require limited numbers of release prints for their particular markets, and to whom costs are of paramount importance.

Industrial, Documentary Market

"The overall savings are appreciable compared with the cost of working in any other 35-mm three-color medium. Additional charges incidental to photographing in 35-mm three-color, such as raw stock, laboratory processing, shipping and equipment costs, might well de-

PROJECTOR SHUTTERS

which forms the mirror image at $X' Y' Z'$ is scattered and utterly lost to the motion picture screen.

'Aerial Image' Inconsequential

It will be seen, therefore, that the real cone of light which a front shutter must intercept has its narrowest beam at the lens itself and that the farther from the lens the shutter is placed, the larger the

cone of the light it must intercept. The boundaries of this cone are outlined by the heavy, full lines. Thus the so-called "aerial image" has *no relation* to the projected picture or to the efficiency of any shutter design.

At the rear of the mechanism, the boundaries of the light cone which a shutter must intercept are those formed by straight lines drawn from the edges of the aperture to the outside of the mir-

or condenser lens. Thus the cone of light which any shutter must intercept is determined by straight lines drawn from the projection screen to the projection lens (for front-shutter projectors) or from the mirror, or condenser lens, to the outside edges of the aperture for rear-shutter projectors.

It is quite obvious that, especially in view of the current use of 4-inch diameter projection lenses, rear shutters are a "must" for high-efficiency projection with a minimum of travel-ghost. The mathematics referred to by Mitchell can be applied to the accompanying sketches without reservation.

The shutter-efficiency figures of Century Model "C" and Model "CC" projectors are correct as related to various shutter designs. We refer Mr. Mitchell and readers to a paper presented by Century before the SMPE in October, 1941: "Recent Developments in Projection Mechanism Design."

This paper, we believe, is the first time that shutter efficiency, as related to projection optics, has been discussed in an authoritative engineering journal. We believe that the principles in this paper outline rather clearly why some projectors are more efficient than others. A review of this paper is interesting and instructive reading as related to the present discussion, and outlines the methods followed in designing Century Model "C" and Model "CC" mechanisms. The same principle can be followed in designing any high-efficiency mechanism.

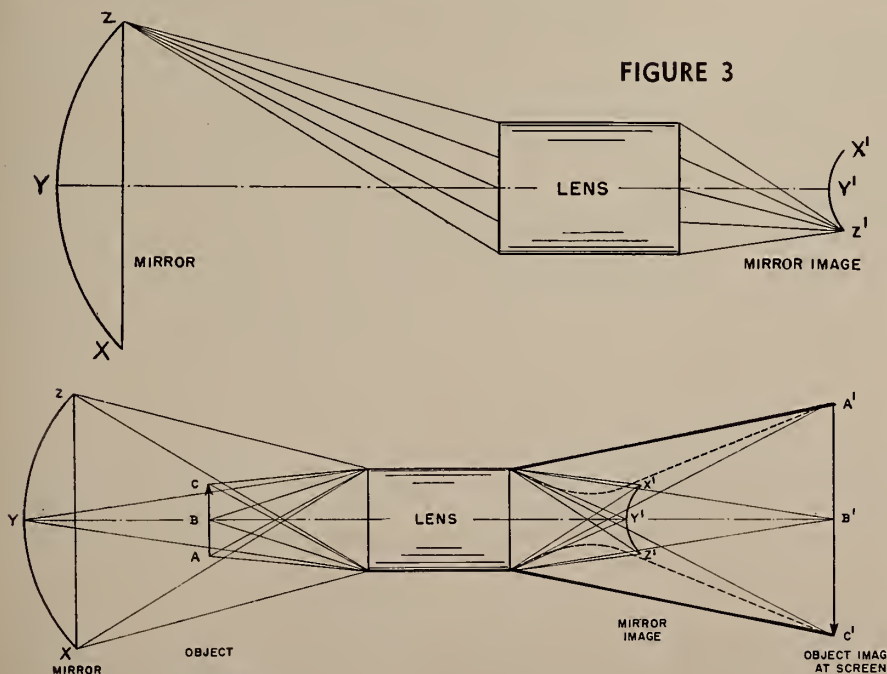


FIGURE 4

termine the difference between profit and loss on some productions.

"Another use for direct blowup theater prints is for the industrial and documentary film market. As a rule, producers in this field work exclusively in 16-mm color, and their films are exhibited to non-theatrical audiences. Occasionally, however, there will be a need for a few 35-mm color prints for special 'showcase' showings in theaters and large auditoriums. Inasmuch as intermediate film steps are not necessary before the first print can be made, even a single print may be ordered without incurring the usual costly preparation work.

"Filmeffects of Hollywood has found the Ansco Color 732 raw stock to be ideally suited to the making of 35-mm three-color theater prints directly from 16-mm reversal color originals. The 732 stock is exposed in an optical printer, enlarging from the 16-mm color original.

"The sound is printed from a 35-mm direct-positive sound track and the film is processed and waxed, and is then ready for theater projection. In this manner, a three-color image can be trans-

ferred from a 16-mm original directly to a 35-mm theater print in one step. There are no intermediate films involved, no registration problems, and the prints can be made at the rate of from 30 to 60 feet per minute.

"The smaller size and the comparatively low cost of 16-mm film should not lead the producer to believe that other requirements have been reduced proportionately. As in all color processes, the quality of the release print depends a great deal upon the perfection of the original photography. A poorly photographed scene in black-and-white can often get by because its deficiencies are recorded only in tones of grey. The same scene photographed poorly in color will usually stand out badly as a glaring misrepresentation of reality.

"The cameraman must pay particular attention to lighting contrasts, color values, and exposures. Also, filming in color causes the problems of makeup, costuming and set decoration to grow in importance. All of these arts become increasingly vital factors to be considered in striving for photographically smooth 35-mm color theater prints."

nology be slighted? As Dr. Card says in his letter, much error exists in this field. Naturally, I regret that I may have added to this confusion; but I shall consider my small efforts entirely worthwhile if they prompt informed persons to come up with the real facts we so badly need.

As regards Muybridge, my sources—and here I relied on a number of well-known encyclopedias—were undoubtedly in error. Leon Bouly, I must confess, is a new name to me. I am wondering if Dr. Card considers him to be the builder of the first machine for film projection. It would seem reasonable, would it not? The "first American feature film" I had in mind was "Judith of Bethulia" (1913). The famous "Birth of a Nation" was issued the following year.

I am also wondering if Dr. Card believes (or suspects) that multireel features were made in America prior to the issuance of "From the Manger to the Cross" in 1912. By the term "multireel" I am referring specifically to a motion picture production four or more reels in length, though perhaps this term is not well chosen, since a two-reel production is a "multireel" subject.

All in all, I am extremely grateful to Dr. Card for his letter. Additional historical information from him would be more than welcome.

ROBERT A. MITCHELL

LETTERS TO THE EDITOR

To the Editor of IP:

The sixth installment of the article "The 35-mm Projection Positive Film," by Robert A. Mitchell, which appeared in your issue for April, 1950 (p. 7), has just come to my attention. I trust that it is not too late to rectify a few misconceptions which are confusing in this field where so many errors already exist.

Mr. Mitchell gives 1881 as the date of Muybridge's projection. Actually, Muybridge projected his pictures on a screen before spectators in San Francisco on May 4, 1880. Detailed reviews may be found in the San Francisco *Alta*, the *Call*, and the *Bulletin*, all of May 5, 1880. The date is of great importance inasmuch as some historians still insist that Muybridge was shown how to project his pictures by Marey and Messonier in France. He did not meet them until the following year.

The 'First Projector' Built?

Mr. Mitchell calls the Lumière Cinematographe "the first film projector ever built," and gives the date as 1894. May we cordially invite him to examine the Cinematograph of Leon Bouly now on display at Eastman House and patented in 1893? It is a combination camera and projector, as was also the Lumière Cinematographe. Mr. Mitchell's description tends to convey the impression that the

Lumière projector and camera of 1894 were separate units; the same machine was used as camera, printer and projector.

The date of "the first American feature film" is given as 1913. The Kalem Company produced "From the Manger to the Cross" (a copy of which I have) in five reels in 1912. Yet I would hesitate to designate it or any other 1912 production as the first American feature.

Mr. Mitchell's material on the much neglected work of Meester and the Skladonowskys is a welcome and valuable contribution.

JAMES CARD, Assistant Curator,
George Eastman House, Inc.
Rochester, New York

To the Editor of IP:

I was delighted to read Dr. James Card's comment on my article, "The Genesis of Standard Film." His criticism of certain factual statements are extremely valuable, and should be of great interest to all who wish to become better acquainted with the history of motion picture technology. Dr. Card is undoubtedly very well informed in this field. I really do wish that someone might prevail upon him to prepare a book on this subject—a book which is very much needed.

Why should the history of movie tech-

To the Editor of IP:

We appreciate very much your fine article on the impending SMPTE screen brightness survey as published in IP for July (p. 10). This article should give your readers a very clear picture of just what we are trying to do.

May we offer one minor correction? We will not be using Fig. 2 shown in your article. The brightness will be measured at the center of the screen to determine screen reflectivity, and this figure can be used with the data of Fig. 1 to calculate the brightness at various points over the screen.

W. W. LOZIER, Chairman,
SMPTE Screen Brightness Committee

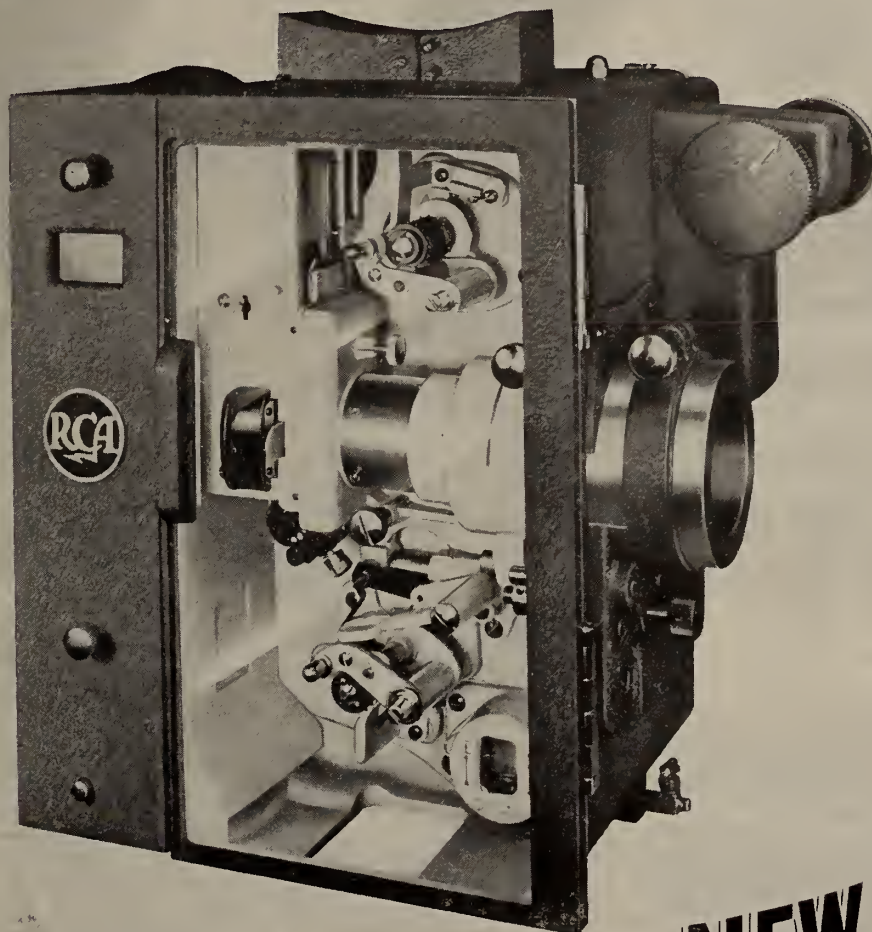
To the Editor of IP:

My sincere thanks to IP for the film cement formulas which you forwarded. These data will be extremely helpful to we projectionists here in New Zealand. We all appreciate this fine, unselfish service by IP.

I have been particularly interested in the series of articles by Robert A. Mitchell in IP, especially in that titled "Notes on Modern Projector Design." Mr. Mitchell has a comprehensive knowledge of projectors both old and new, and it is evident that he has a very high regard for the Ernemann (German) mechanisms.

DOUGLAS A. HARLEY
Auckland, New Zealand

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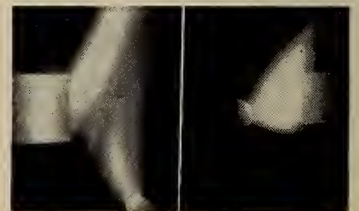
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General Precision's New Sprocket-Intermittent 16-mm Projector Eliminates Studio Tie-Ins on Tv Remotes

THE first film commercials ever telecast from a remote control point without a studio switchback were sent out over the ABC network on Sept. 16 as a new type of utility projector produced by General Precision Laboratory made its television debut. During a professional football game between the Philadelphia Eagles and Cleveland Browns in Philadelphia's Municipal Stadium, commercials were projected direct from the film into ABC's image Orthicon camera, eliminating the need of studio standby facilities to handle commercials for approximately three hours.

The new projector greatly simplified the usual procedure by eliminating extra studio tie-in facilities ordinarily required when switchbacks have to be made to run commercials on studio projection equipment. The GPL projector made a Tv remote unit independent and "really mobile" for the first time.

Features 3/2 Sprocket-Intermittent

The new projector features a "3-2 pull-down" sprocket intermittent which solves the problem of passing 60 evenly-spaced light pulses through film which runs through the projector at 24 frames per second. If the film were pulled down at normal intervals, some light pulses would occur during pulldown, causing excessive flicker in the Tv picture.

With the new GPL projector, one frame of film remains in place while three light pulses occur, then the film is pulled down. The next frame waits for only two light pulses before pull-down. Then the next frame gets three, the next two, and so on. The result is 60 pulses through 24 frames and flicker is eliminated.

Combines With Standard Units

This 3-2 system makes it possible to combine the projector with standard image Orthicon cameras used for sports and studio telecasts, whereas studio film-chain systems require special Iconoscope cameras electronically timed to the projector.

GPL's new projector uses a professional sprocket-type intermittent, with precision-formed teeth that mesh with

four sprocket holes of the film at all times. It will pass film having three torn sprocket holes in a row. In GPL tests, standard 16-mm film has been projected 4000 times without damage.

Light Distribution Ratio

Center-to-corner light distribution ratio is 90%, with picture resolution of 90 lines per mm, assuring sharp, clear pictures. Sound fidelity is comparable to that of professional 35-mm projectors.

When not in use for telecasts, the GPL projector may be used in any Tv studio with a shadow box or for projecting directly onto an image Orthicon or an Iconoscope camera. It may also be used for pre-viewing films, as a standby projector, or as a rear-screen projector.

* * *

FCC Tv 'Freeze' in 3rd Year

The television industry circled Oct. 2 last on the calendar, marking the start of a third year for the freeze on new Tv station permits. It was a reluctant gesture, for no one foresaw an end to the freeze which the F.C.C. invoked Oct. 1, 1948, "for about six months." The FCC finds itself caught between a constantly swelling demand for more Tv outlets.

There is nothing whatever to indicate that the commission will authorize additional stations until it has gone through its announced schedule of disposing of color, providing more Tv broadcasting channels and adopting a new channel allocation plan for the whole country.

Terrific Color Tv Rumpus

The consideration of color—just one of the reasons for the freeze—took up almost all of the past year. And the commission still is not finished with that problem. Meanwhile, television functions with 105 operating outlets, about 8,000,000 receivers in the hands of the public, and more than 43% of the population still outside the viewing range.

The recent approval by the F.C.C. of the Columbia Broadcasting System's sequential, mechanical method for color Tv, as opposed to all-electronic systems available, has stirred up a hornet's nest

in the industry and bears promise of vigorous legal action against the commission to overturn the verdict.

* * *

Par's Tv 'Depth' Attachment

A simple attachment to the home television set which will create the illusion of a third dimension and bring out much sharper black-and-white contrast has been developed by Paramount and will be marketed shortly. Device would retail at less than \$1, it was hinted, and is compatible with present Tv receivers.

Three-dimensional Tv has already been used experimentally, and was developed for atomic scientists' use. For the atomic experiments, the camera had two lenses, set a few inches apart, with the lenses focusing two pictures on a single Tv tube, one almost a "shadow" of the other. The receiver had two polarizing filters, and the viewer, by wearing polarizing glasses, saw the image as a single picture having depth and body.

Development, while supposedly doing away with the viewer's glasses, merely creates an illusion of depth perception. However, reception for the average program on home sets is reportedly so much improved that the public is expected to take kindly to the new device on that basis alone.

* * *

Theater Tv Football N.S.G.

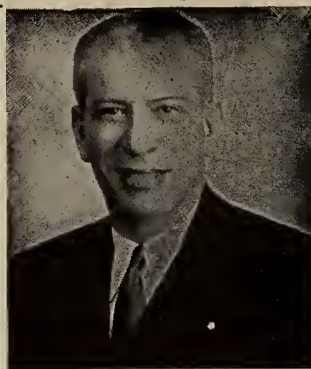
Attendance at the three theaters—in Brooklyn and Chicago—which showed large-screen Tv pictures of Notre Dame's first two football games ranged from acceptable to weak. Reason advanced in some quarters was two-fold: N.D. opponents, North Carolina and Purdue, were not overly appealing, and competition from the baseball World Series radio broadcasts.

Two-for-one Programs

State-Lake theater, Chicago, drew 1500 attendance in its 3000-seater; while the Brooklyn Fox merely reported "above average" business—without mentioning the fact that patrons could also see the regular screen show in addition. Tivoli, Chicago, drew only 600 against a capacity of 3400.

Michigan Theater in Detroit, 4000 seats, drew 2000 customers for its showing of televised Michigan-Michigan State game.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

ONE of the most encouraging signs of the growing tendency toward closer ties between manufacturers and projectionists—the makers and the operators of equipment—was the course of instruction in theater Tv recently concluded at the RCA plant in Camden, N. J. Sponsored jointly by the IA and RCA, this course (described in detail elsewhere herein) represented a most ambitious and comprehensive schedule for the 30 IA men from all sections of the country during the all too brief period of the week in which it was in progress.

There has been a noticeable lack of such cooperation between craft and manufacturer in recent years—yet both groups are blood brothers under the skin, so to speak, because each is indispensable to the other: the best craftsmanship cannot invest an inferior equipment with qualities that should have been built into it, and the best of equipment can suffer through improper handling.

Time was when instructional meetings between projectionist and manufacturing groups were commonplace events, something to be expected in the ordinary course of events whenever a new equipment was introduced. Of late, however, such get-togethers are a rarity, whether due to the post-war boom in equipment sales or to the apathy of leaders in both camps it is difficult to say.

The IA is to be commended for its initiative in arranging for this Tv course; and for RCA Service Co., and in particular for its president, Ed Cahill, we express the warmest praise. We hope that this Tv course is the signal for a greatly expanded schedule of such meetings on a varied list of equipment.

• IA President Walsh was chosen to succeed Dave Beck as fifth vice-president of the Union Label Trades Department, AF of L. In announcing the appointment, Raymond F. Leheney, secretary-treasurer of the Department, said: "Mr. Walsh comes to the Department as an outstandingly successful leader of an affiliate which is doing excellent work for the Union Label. . . . Dick Walsh

will be a valuable as well as able counselor on the Board."

• The unhappy lot of polio victims at the Long Beach (Calif.) General Hospital was brightened considerably during the past two years by the sound film shows put on by members of Long Beach Local 521. This was part of a plan which originated in 1948 from suggestions made by a local newspaper columnist, and which was supported by contributions to the Long Beach Polio Film Fund. The members of Local 521 donated their services to this worthy project.

• The National Labor Relations Board recently ruled that a company which insisted that it was financially unable to make a wage change, but refused to furnish the union with any information to support its assertion, violated the Taft-Hartley Act by failing to bargain in good faith. This important ruling was made in a case where a company nego-

tiated with an AF of L union for over 11 months, the while insisting that it could not afford a wage increase because of poor business conditions. The union scaled down considerably its original demands, but still nothing happened. When the union was refused certain data on the company's financial operations, the matter was taken to the NLRB. The Board's decision was unanimous and the company was ordered to resume bargaining in good faith.

• A note from Leon E. Burton, treasurer of Local 253, Rochester, N. Y., informs us that he has held that office for the past 32 years—a record hard to beat.

• The family of R. E. (Rut) Morris, Sr., secretary of District No. 7, is mighty proud of Mrs. R. E. Morris, Sr., and rightly so. Mrs. Morris, a grandmother at 46, graduated from Spring Hill College, Atlanta, Ga., last Spring, "summa cum laude," the highest scholastic honor attainable. Interested in the work of

WORTHY ADDITION TO THE RAPIDLY GROWING PRESTIGE OF IA UNITS NATION-WIDE



Reflecting the growth of IA Local 279, Houston, Texas, from 41 members in 1940 to its 138-member enrollment today is this view of the really beautiful yet eminently functional clubhouse which was dedicated recently. Spearheading the drive which saw the Local 279 membership exert to the utmost its moral, physical and financial support was Eddie Miller, business monogor and IA district representative; his assistant, Frank Coogler; Charles Smith, president, and Lew Evans, secretary. A far cry from the dingy Union meeting halls of yesteryear, these quarters constitute tangible evidence of the growth in prestige and a sense of responsibility to the industry which they serve of IA members everywhere.

her son Russell, Jr., a student of biology, and wishing to know enough about the subject to be able to share his interest, Mrs. Morris enrolled at the Spring Hill College. Her excellent record was all the more remarkable, for biology is considered a "tough" course at Spring Hill. Mrs. Morris has remained at the college as an instructor and lab supervisor, and plans to continue her studies.

Russell, Jr., is also the recipient of two college degrees—a B.S. from Spring Hill, and an M.S. from St. Louis University. He is now studying for his Ph D. at Emory University, after which he will essay an M.D.

• *Out-of-town visitors:* John Morgan, Kansas City Local 170; John Davenport, Providence Local 223, and Milton Siegel, Chicago Local 110.

• Nat Golden, chief of the motion picture division of the Department of Commerce, and member for the past 38 years of Cleveland Local 160, was named to represent the motion picture industry in the National Production Authority, a new agency set up to control materials for civilian use. He will be in charge of photographic and motion picture industry products. Nat is a veteran of World War I and has been associated with the Dept. of Commerce in Washington, D. C. for the past 24 years.

• Despite repeated warnings not to remove burning film, there still are projectionists who persist in playing heroics at the risk of their lives. A recent case concerned Warren Teker, projectionist at the Leith Opera House, Carson, N. Dak., who suffered severe burns when he attempted to remove a blazing reel of film from the projector. Fortunately, his co-worker, Milton Schleve, was in the room at the time and smothered the blaze with a fire extinguisher.

• We are glad to report that Wally Snyder, representing Local 586, Hastings, Nebr., at the recent Nebraska Stage Federation of Labor meeting, is recuperating from the virus infection which hospitalized him at the opening of the convention. Wally is 4th vice-president of the Federation.

• An automobile mishap caused the death several weeks ago of David Block, member of Detroit Local 199 and projectionist at the Alger Theater. Serious injuries were sustained by his wife and child who also were in the car.

• Among those attending the last meeting of the 25-30 Club of New York were R. B. Thompkins, president, and Arthur E. Meyer, general sales manager, of International Projector Corp. Messrs.

Employer-Participation Welfare Plan for Local 306

FOLLOWING extended and combated negotiations, IA Local 306 (projectionists of New York City) appears at this writing to have won an arduous battle for the establishment of a welfare fund which will be financed in large part by direct contributions by employers to a welfare fund which will be administered by an equal number of representatives of the Union and the exhibitors.

Participating in the discussions was the IA General Office, which would seem to indicate an ever-increasing interest by the International in a welfare program for IA unions on a national scale.

Administration of Fund

Basis of the projected plan is the payment by exhibitors into a welfare fund of 5% of the basic wage scale for each employee at the rate of 54 weeks annually to include the two-weeks' vacation relief man. Local 306 now has a welfare plan of its own; and a comparison of the two plans is presented elsewhere on this page.

The welfare plan will be administered

by an equal number of representatives of the Union and the employers. In the event of a deadlock among the administrators of the fund, provision is made for the appointment of an impartial arbitrator, whose decision shall be final. Should the administrators fail to agree upon the naming of an arbitrator, the matter will be referred for final decision to a judge of the U. S. District Court.

The negotiations were complicated by the existence for some years now of pension plans on both the Loew and RKO circuits (about 100 theaters) and in the Roxy Theater on Broadway. Arrangements for the inclusion of these situations in the general over-all Local 306 plan were finally worked out, with the Loew participation retroactive to March 1, 1950, and RKO and the Roxy coming in as of Sept. 1, 1950.

The funds already accumulated in these funds will be retained by them, with Loew and the Roxy ultimately paying off when the employee either reaches the age of 65 years or dies. The RKO

(Continued on next page)

Thompkins and Meyer are honorary members of the Club, and from time to time drop in at the regular meetings to chat with the boys.

• Jim Hogue, member of Houston Local 279 and World War II veteran, was among the first IA men to be recalled to the colors, and is now fighting with the Marines in Korea. Jim is a son of Jess Hogue, one of the old-timers in the Houston Local.

25 Years Ago—October 1925

• Harry Sherman was appointed assistant IA president to succeed Harry L. Spencer, who resigned. . . . A warning was issued to all Local Unions to be on the lookout for G. W. Scott, suspended member of New York City Local 306, who made a practice of borrowing money from out-of-town Locals on the false claim that he was an IA representative. He was very active in Pennsylvania. . . . Local Unions urged to advise the General Office before proceeding with any strike action, so as to give the International an opportunity of effecting a satisfactory settlement. . . . The General Executive Board met in Atlantic City. . . . Ralph M. Behling, former business representative for Brooklyn Local 4 who was suspended from the Local, lost his appeal for reinstatement before the General Executive Board. . . . The agreement between Los Angeles Local 37 and the Carpenters' and Joiners' Union was ratified. . . . Theater Ushers, Door-

men and Cashiers' Union's request for an IA charter was denied. . . . Wm. H. Hale and Albert Dennison, members of Local 299, Winnipeg, Canada, were fined \$250 each for refusal to obey instructions from the General Office to withdraw from the Metropolitan Theater, which was listed as unfair to Winnipeg Local 63.

• A stunning surprise was the news of the sudden death on Oct. 2 of Fred J. Raoul, business representative for Atlanta Local 225. Young Raoul was the son of William P. (Fred) Raoul, IA General secretary-treasurer, and was one of a selected number of men who attended the recent IA-RCA Tv class at Camden, N. J. He is survived by his widow and two young daughters.

• Los Angeles Local 150 will be represented at the forthcoming California State Federation of Labor meeting, which will be held in conjunction with the meeting of the California Theatrical Federation, by George J. Schaffer, Mort Sands, Magnus Nielsen, John Maynard, Clay Blanchett, Leo Stockwell, and, as alternate, Clair Piper.

• Congratulations to Nat Storch, president of Local 366, Westchester County, N. Y., for the past 25 years, on his recent marriage to Sadie Lefkowitz. Nat was considered an inveterate bachelor, and we can attribute his change of heart to the compelling charms of a gracious lady.

plan, however, involves the retention by the employe of his job with the circuit until he is 65 years of age, and his leave-taking for any reason before that age would result in his getting *nothing*.

Final Payoff the Test

The 65-years-of-age proviso for job-holding as an absolute condition for payoff constitutes eloquent testimony to the fundamental phoniness of many so-called welfare plans, as is the fact that not a few such arrangements involve a final payoff *less* whatever the beneficiary receives from Social Security. The projected Local 306 plan described herein is *exclusive* of any Social Security payments, as is the welfare plan instituted by Chicago Local 110 two years ago.

A radical departure from the past practice will ensue upon the introduction of this employer-participation plan, in that the employers, *exclusive* of the so-called Broadway de luxe theaters, will surrender the right previously enjoyed of being able to "request" 50% of their total manpower for a given house. In the past the exhibitors had the right to "request" by name one man for every man assigned by the Union to a given theater. All placements in future will be made in accordance with the Union's seniority rule, except in the Broadway houses, which will continue to exercise the 50%

"request" privilege for a specific man.

Participation in the plan is elective upon the part of exhibitors under the jurisdiction of Local 306, and should any employer refuse to go along with the plan, the Union will negotiate on the basis of a wage increase which will be paid directly to the employe, who in turn will continue to pay to the Union the same assessments that he does at present, as indicated in the comparative table. Irrespective of whether a given employer participates in the plan, *all* members of Local 306 will participate in the benefits—the only difference being the source of the payments as between those direct from the employer or those from the member.

Health, Hospitalization Feature

Probably the most important benefits to be derived by the individual Union member from the plan are those stemming from the Health and Hospitalization provisions. This feature, involving the services of the Blue Cross and of the Health Insurance Plan of Greater New York, two outstanding organizations in the social service field, will cover each Union member on either a voluntary or involuntary basis for every aspect of medical care. The word "voluntary" may be construed as meaning *preventive* medical care as contrasted with the

meaning of "involuntary" as *corrective* care.

This feature is exceptionally comprehensive in that it includes no restrictions anent any form of medical treatment, from a routine general checkup to and through surgery and hospitalization for a protracted period of time.

U. S. Treasury O.K. Needed

This employer-participation welfare plan will be activated immediately upon receipt of an approval by the U. S. Treasury Dept., since the Bureau of Internal Revenue has the last word on the disposition of funds which, as is inherent in such plans, are tax-free.

The keen interest of the IA General Office in this Local 306 plan, as evidenced by its participation therein, is indicated by the statement issued by President Walsh upon the completion of negotiations, as follows:

"Welfare provision on a national scale for all members of the IA must come sometime, and they may as well have their inception in New York City."

GoldE Mfg.'s 25th Anniversary

The GoldE Manufacturing Co., of Chicago, is now observing its 25th anniversary as a manufacturer and distributor of a score of products for the professional, amateur, industrial and educational motion picture fields. The company was founded by Maurice H. Goldberg, a charter member of IA Local 110, Chicago.

From a small beginning which included the manufacture of only a couple equipment units for theater projection rooms, Maurice Goldberg painstakingly built up the GoldE business until it numbered in its catalog a score of equipments, large and small, which served many diverse interests in practically all branches of the photographic field. Mr. Goldberg's untimely death in 1945 marked the passing of a real pioneering spirit.

The myriad activities and products of GoldE are now directed by M. H.'s son, Ernest, who has been president for the past five years. A firm believer in research and development work, Ernie promises that these activities will be expanded so that GoldE products will continue to maintain high position in the photo equipment field.

Raytone to Distribute 'Superlite' Lens

Projection Optics Co., 330 Lyell Ave., Rochester, N. Y., has announced the appointment of Raytone Screen Co., 165 Clermont Ave., Brooklyn 5, N. Y., as the exclusive distributors for the former's Superlite 35-mm film for professional theater projection. Raytone is rapidly expanding its line of motion picture theater equipment.

Comparison Between Present All-Local 306 and Projected Employer-Participation Welfare Plans

Present All-Local 306

HOW FINANCED: Each member pays into a contingency fund \$3.25 each quarter, plus one cent per week, per man on the retired pension roll, plus a special assessment of \$1.75 for each death payment. The foregoing payments are in addition to regular Union dues.

SICK BENEFITS: \$20 weekly for the first 10 weeks, then \$10 weekly for the following 20 weeks—this over-all time period being liberally construed in practice. (In addition, the New York State Disability Law provides for the payment concurrently of \$26 weekly for 13 weeks.)

RETIREMENT: For age: applicant must be at least 60 years of age and have been a member of Local 306 for 20 consecutive years. For total disability: applicant must be at least 50 years of age and have been a member of Local 306 for 25 consecutive years. Weekly payment in either case is \$21.

DEATH PAYMENT: Prompt payment (usually within 48 hours) of \$4,000 to the heirs or assigns of the deceased.

[It will be noted that the present welfare setup of Local 306 makes no provision for health and hospitalization programs—a vital factor in the projected plan.]

Employer-Participation

HOW FINANCED: Payment by exhibitor to welfare fund of 5% of the basic wage scale for each man employed. Payments will total 54 weeks annually, to cover two-weeks' vacation relief. Local 306 members so covered will continue to pay into the fund \$3.25 quarterly, plus the regular Union dues, but they will be exempt from the \$1.75 assessment for each death and also from the weekly payment of one cent per week, per man on the retired pension roll. (This represents a saving of approximately \$100 annually to the individual Union member.)

SICK BENEFITS: Same as under Union plan: \$20 weekly for the first 10 weeks, then \$10 weekly for the following 20 weeks (plus N. Y. State disability payments of \$26 weekly for 13 weeks).

RETIREMENT: Weekly payment is \$30, an increase of \$9 over present level. For age: 60 years of age and a member of Local 306 for 20 consecutive years. For disability: at least 50 years of age and a member of Local 306 for 25 consecutive years.

DEATH PAYMENT: Remains \$4000.

HEALTH, HOSPITALIZATION: An important added feature in this plan, described in detail in the accompanying story.

The Projection of Safety Film

A comprehensive analysis of the comparatively new triacetate (safety) film, including notes on its anatomy and characteristic qualities during projection, plus numerous practical hints as to splicing and general handling to effect optimum results.

By ROBERT A. MITCHELL

PROJECTIONISTS generally have voiced a number of gripes concerning the working characteristics of the new triacetate safety film. Significantly, those who praise safety film are not the ones who must project it day after day. Bluntly, the average projectionist is convinced that triacetate film fails to measure up to the performance of standard nitrate prints.

Current complaints are sufficient evidence that the first projectionist objections to triacetate prints were by no means expressions of unwarranted prejudice against an innovation. A limited survey of the field indicates rather positively that something is wrong, either with the new film stock itself, or with the way triacetate is processed and handled. Undoubtedly, a more comprehensive poll would substantiate these findings.

Triacetate film is superior to nitrate stock in several very important respects, notably in combustion characteristics, resistance to the effects of heat during projection, and permanence. The successful production of a slow-burning and permanent film has been rightly hailed as a distinctly forward step on the score of imperishability and an enhanced safety factor.

The Projectionist Viewpoint

On the other hand, triacetate stock is slightly inferior to *new* nitrate stock in tenacity, tear strength, flexibility, elasticity, a tendency to become deformed by stresses and strains, and fewer readily obtainable solvent chemicals from which satisfactory triacetate film cements can be made. These properties of triacetate base do not entirely account for the following projectionist complaints:

1. Triacetate film is more difficult to splice than nitrate film.
2. Splices in safety film come apart too readily.
3. Safety prints are difficult to focus.

The complaint that safety prints make it difficult, or in some cases impossible, to obtain good image definition on the screen leaves the writer nonplussed. There is no conceivable reason, all theoretical factors considered, why pictures printed on triacetate stock should be photographically inferior to pictures on nitrate stock. The film base, after all, serves merely as a *support* for the photographic emulsion.

Concerning emulsion, the base need only be tough, smooth, and transparent. The exact chemical constitution of the base has no effect on the sharpness of images formed by the developed silver or colored dyes in the emulsion. Oscillographic comparisons of 9000-cycle sound recorded on both types of stock show no discernible difference: the wave-form of the high-frequency record is a trifle "fuzzy" on each type.

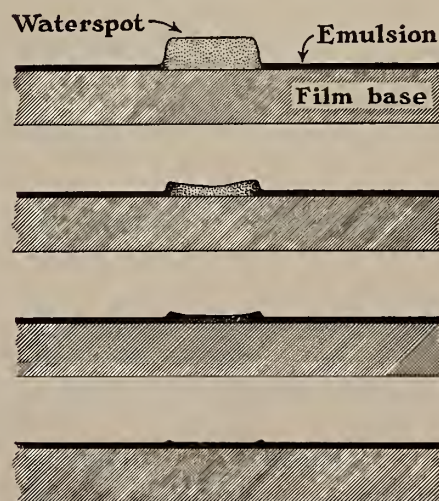
Test films for both picture projection and sound reproduction are usually made on safety stock. This would not be done by the SMPTE and other technical organizations if the photographic quality of triacetate film were below par in any respect.

Concerning Picture Definition

Have projectionists been imagining things? If they have, the writer is also a victim of hallucinations. We are reasonably sure that the film base cannot affect photographic definition *on the film*; but we also know that the picture definition obtainable from many triacetate releases is not all that it should be.

A number of factors in the projection

SHOWING THE WAY A WATERSPOT ON FILM EMULSION DRIES



Gelatine has the unusual property of swelling and shrinking almost wholly in one direction. When film emulsion expands under the influence of moisture, it does so in the single dimension—that of thickness.

process affect sharpness of focus, aside from faulty photographic images. Does the cause of "fuzzy" projection lie in extraneous movement of film in the projector gate? A very rapid flutter of the film, for example, may simulate out-of-focus conditions so closely as to deceive an observer. Such effects are most noticeable where the heat from extremely high-amperage lamps contributes to flutter by frame-embossing the film.

All of the available evidence, however, goes to show that film-flutter is relatively rare with safety stock. Focus drift is an entirely different matter.

When film is rolled up tightly and stored for a period of hours or days, the phenomenon of *cold flow* causes it to become deformed longitudinally (especially the layers near the center of the roll). This type of deformation is evidenced by a stubborn curliness. The effect of "cold flow" is easily demonstrated by creasing, or bending, film beyond its "elastic limit." The crease will be permanent.

Deformation, Focus Drift

Triacetate film base, as now formulated, has only 75% of the elasticity of nitrate base, and is also nearly 9% more susceptible to curl deformation than is nitrate base.

The heat encountered by the film during projection results in a lateral deformation which shows up as buckling, another important cause of focus-drift effects. Because triacetate film is less susceptible to the effects of heat than nitrate film, this cannot be considered a major cause of the bad focus characteristics associated with triacetate prints.

Focus drift, *if progressive and regular*, simply requires the projectionist to sharpen the focus a few times during the projection of a single reel. It is not enough to focus sharply only the opening scene of a film having this defect. If attention is not subsequently given to the focus, the concluding scenes in the reel may be far out of focus.

Irregular focus drift, often noticed in composite reels made up of several small rolls spliced together, is particularly troublesome. Every projectionist has it to contend with during the showing of previews and other trailer material. Projection with extremely high-powered arcs

may introduce erratic focus drift into otherwise perfect prints.

Projectionists have plenty of work to do without keeping one hand glued to the focusing knob. The responsibility for focus drift rests ultimately on the manufacturers of film.

Focusing of Color Prints

Focusing troubles have always bedeviled color prints. The first triacetate prints to make their appearance in the theater field, the reader will recall, were predominantly of the "duplitzed" (double-coated) color type, notably the Trucolor releases (Republic). A few projectionists, not understanding the limitations inherent in duplitzed color films, have been quick to blame triacetate base for everything from fuzzy color images to the bright green horses seen galloping through some of Republic's westerns.

It is actually impossible to project perfectly sharp pictures from any duplitzed print for the simple reason that the two emulsions—the red-orange and the green-blue—are separated from each other by the thickness of the film base. For all practical purposes, the images on photographic film lie on the surface of the emulsion, hence the red-orange and green-blue images are separated by the total thickness of the double-coated film.

Film manufacturers make every effort to insure uniform thickness of the base. Variations in the thickness of emulsion-coated film are ordinarily due to variations in the thickness of the emulsion. These differences in thickness arise from such causes as the age of the film, the temperatures to which it has been subjected, and the humidity of the atmosphere. The hardened emulsion of old, well-seasoned prints is thinner than that of freshly processed film. Emulsion is thicker in a damp atmosphere than in dry air because gelatine readily absorbs moisture, swelling as it does so.

Measurements of a wide variety of American and European film samples indicate that emulsion thickness ranges from 0.0003 to 0.0006 inch. A good value for the emulsion thickness of the average "broken-in" theater print under normal conditions is 0.0005 inch.

Nitrate, Acetate Film Thickness

The usual thickness of uncoated nitrate base is 0.00525 inch; of uncoated triacetate base, 0.00550 inch. The average thicknesses of these two types of film when coated with emulsion on *one* side are:

Single-coated Nitrate film 0.00575 in.
Single-coated Triacetate film 0.00600 in.
The film base used for duplitzed stock, however, is made thinner: 0.00500 inch for nitrate, and 0.00525 inch for triacetate. Hence the average thicknesses of

the two films when coated with emulsion on *both* sides are:

Duplitzed Nitrate film 0.00600 inch
Duplitzed Triacetate film 0.00625 inch

The red and the blue photographic images on double-coated color film are considered for practical purposes to be separated by distances identical with these duplitzed film thicknesses.

Are these distances of separation of the red and blue images great enough to show up on the screen as a blurry picture. The answer is both "yes" and "no." The deciding factor is the *depth of focus* of the projection lens used.

Depth of focus of a projection lens, which may be described as tolerance of minute errors in lens position, contributes to the ease of obtaining—and maintaining—a critically sharp focus on the screen. Lenses of long focal length have a greater depth of focus than short-focus lenses. And lenses of small diameter have a greater depth of focus than large ones.

Latitude of Lens Movement

The depth of focus of a modern F:1.9 or F:2.0 lens of 4 inches E.F. is great enough to permit the lens to be moved forward or back about 0.003 inch without producing a visible change in the definition of the screen image. Large lenses of the 5 to 6 inch focal lengths may be moved through 0.004 inch, and lenses of the 7 to 9 inch focal lengths

through 0.005 inch, without affecting the clearness of the picture.

It stands to reason, then, that the separation of the superposed red and blue photographic images by approximately 0.006 of an inch actually does prevent a critically sharp screen image from being obtained when the lens E.F. is shorter than 8 or 9 inches. But the blurring effect of this separation is usually masked completely, when lenses of longer focal length than 5 inches are used, by the graininess of the images and minute departures from perfect registration of the two colors.

The difference in the thickness of nitrate and triacetate base used for duplitzed color prints—a difference of only 4%—is not sufficient to account for any additional loss of screen definition. This important fact may be demonstrated conclusively by calculations based upon equations for determining conjugate foci and the range of acceptable definition when depth of focus is known.

Assume that 4-inch lenses are used in a theater having a projection throw of 134 feet. If the blue image of a *nitrate* duplitzed color film is focused sharply on the screen, the "effective plane" of the lens will be exactly 4.01 inches from the surface of the blue emulsion. The red emulsion, however, will lie 0.006 inch nearer the lens, or 4.004 inches from the effective lens-plane. If the screen and the back wall of the theater

Projectionist Examination Questions

Based on Examinations by Leading U. S. Municipalities

1. The chief advantage of D. C. over A. C. for the projection of motion picture is that D. C. is (a) easier to obtain; (b) gives a steadier arc; (c) costs less to use, or (d) is safer to use.
2. The number of moving parts in a transformer is (a) none; (b) one; (c) two, or (d) more than two.
3. The type of current which may be obtained from the secondary of a power transformer is (a) pulsating D.C.; (b) intermittent D.C.; (c) D.C., or (d) A.C.
4. The device used to smooth out the ripples of rectified A.C. is called (a) choke; (b) filter; (c) condenser, or (d) commutator.
5. The polarity of the neutral of an Edison 3-wire system D.C. system may be (a) either positive or negative; (b) neither positive nor negative; (c) positive only, or (d) negative only.
6. That one of the following which is not an essential physical part of a D.C. generator is (a) armature; (b) torque; (c) commutator, or (d) field coils.
7. The most luminous part of a D.C. arc is (a) the positive crater; (b) the negative crater; (c) the edge of the positive crater, or (d) the edge of the negative crater.
8. The fuse blows every time you strike the arc. The lamphouse is wired correctly. The trouble will probably be found in (a) the lamphouse; (b) table switch; (c) mains, or (d) rheostat.
9. In a D.C. low-intensity, reflector-type arc, with horizontal trim, the position of the negative carbon with respect to that of the positive should be (a) slightly higher; (b) exactly level; (c) slightly lower, or (d) much lower.
10. Ballast resistors are required when the arc operates on (a) polyphase; (b) pulsating current; (c) a 120-volt D.C. motor generator set, or (d) a lamphouse using an incandescent lamp.

are somehow removed, it will be found that the red image has its sharpest focus 334 feet from the projector.

Loss of Image Quality

Conversely, if the red emulsion is the one which the projectionist focuses sharply on the screen 134 feet from the machine, the focal distance of this emulsion is 4.01 inches, and that of the blue emulsion (0.006 inch farther from the lens) is 4.016 inches. The blue image will then have its sharpest focus in front of the screen—exactly 84 feet from the projector.

If, now, a triacetate duplitzed film is shown with the blue emulsion in perfect focus, the focal distance of the red emulsion is 4.00375 inches, and the red image would have its best definition 356 feet from the machine. And if the red emulsion is brought into focus on the screen 134 feet distant, the blue image (focal distance 4.01625 inches) will have its sharpest focus 82¾ feet from the projector.

It is discovered, by evaluating the reciprocals of these data, that the use of triacetate stock for duplitzed color films results in a loss of image quality of 3.55%, as compared with the quality obtainable from nitrate duplitzed films, when projected with 4-inch lenses. This degree of image impairment is probably entirely masked by intrinsic defects of the duplitzed process, and in any case is too slight to be visible.

Complaints anent the difficulty of focusing have also been leveled against prints made by the Technicolor process. Technicolor, being a truly *natural color* process, utilizes three color records: yellow (the complementary of indigo), magenta (the complementary of green), and cyan (the complementary of vermilion). Because the yellow, magenta, and cyan images are superposed in a single emulsion by the imbibition method, no definition is lost by a physical separation, as is the case with duplitzed prints.

Perfect Print Registration Vital

Nevertheless, the smallest departure from perfect registration of the three colors results in considerable fuzziness of the picture, as does also any "spreading" of the imbibition dyes. Printing from wornout sets of matrix films is still another cause of blurry Technicolor. The thickness of the film base has no effect upon the quality of Technicolor.

Examination of Technicolor samples under a microscope reveals a definition quality rather lower than that of good black-and-white prints. But on the whole, Technicolor prints are sufficiently sharp in pictorial detail as to occasion no trouble in obtaining a good focus on the screen. The exceptions, strangely, seem

(Continued on page 31)

Definitions of Optical Terms

By E. O. KOLLMORGEN

Kollmorgen Optical Company

Because of the increasing emphasis upon high-order optics in the projection process (including Tv), and recognizing a tendency on the part of the craft to favor the mechanical aspects of the art, IP has and will continue to provide a steady flow of optical data which bear directly upon practical projection.

THIRD-ORDER ABERRATIONS: A technical term of interest mainly to lens designers. The exact statement of the formulae used in ray-tracing involves expressions equivalent to a series of terms in ascending odd powers beginning with one (1)—i. e., X^1 , X^3 , X^5 , and so on.

Equations using the first term only are employed for rough approximations; those using the first two terms (called "third-order equations" because they involve the third power); are used extensively in preliminary design and give a pretty good idea of the performance that can be expected from the system. In the final computation of a highly corrected lens, such as the Super-Snaplite (Kollmorgen) projection lens, the exact values of the mathematical expressions must be employed.

A "third-order aberration" is, therefore, one disclosed by lens computation using third-order equations. There is another kind of third-order, or tertiary, aberration, relating to residual color in an apochromatic lens system, but this also is quite technical and of little interest to the practical man working in the theater or the studio.

SPHERICAL ABERRATION: In an uncorrected objective lens system, the rays from the center of the object which pass near the edge of the lens are bent more sharply than those passing near the center of the lens, and in consequence are brought to focus at a point nearer the lens itself. If the center of the object is a bright point of light, its image appears as a similar point, but surrounded with a blurred circle.

COMA: This is similar to spherical

aberration, but of a non-symmetrical character affecting images of points not at the center of the object. The blur of each image point in this case is not a circle, but a tail like a comet (hence the name) extending toward or away from the center of the image.

ASTIGMATISM: Astigmatism, like coma, affects only the images of points off the optical axis. It is the tendency to image the object point as two short lines, mutually perpendicular and longitudinally displaced from each other. Between these two lines lies an "image," or blur pattern, of minimum size.

CURVATURE OF FIELD: In the simple case, curvature of field occurs when a flat object is imaged on a curved surface, usually concave with respect to the lens. Sometimes this aberration can be overcome by curving the object itself, as in the case of the curved slit used in sound reproduction, or the curved surface of a television tube. Curvature of field is usually accompanied by astigmatic differences.

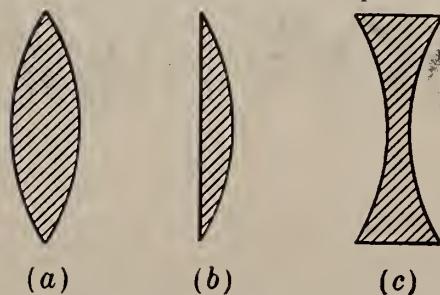
DISTORTION: Distortion occurs when the magnification of the system is not uniform across the entire image. If regions near the edge of the object are magnified more than those near the center, "cushion" distortion is present, so called from the appearance of the image of a square or rectangle. If the reverse is true, the phenomenon is called "barrel" distortion.

Optical systems generally suffer, to a greater or lesser extent, from all these aberrations in combination, plus color aberration in the case of white-light illumination. The problem of the optical designer is to reduce them to a minimum; and how well he has succeeded is evident in the really excellent projection lenses available today.

Add to Sign-of-the-Times Dept.

Warners has opened its extensive music library to television in an agreement with Snader Teletranscriptions under which Snader will use Warner songs in 960 television films a year on a percentage of gross receipts arrangement.

Subjects will be three-minute films, each constituting a picturization or the singing of one song.



Cross-sectional views of lenses: (a) double-convex; (b) plano-convex, and (c) double-concave.

IA-RCA Theater Tv School a Huge Success

ANOTHER milestone in the history of the theater industry, bearing on the relationship between manufacturer and projectionist and employer and Union man, was passed on Sept. 15, when Ed Cahill, president of RCA Service Co., presented certificates of accomplishment to 30 projectionist members of the IA who on that day completed a one-week theater television training course sponsored jointly by RCA and the IA.

The training course started to take form last Spring after President Dick Walsh and Mr. Cahill explored the idea and considered the worth of its possibilities to both organizations. The selection of projectionists who took the course was made entirely by the IA, with emphasis being placed upon proper graphical distribution and coverage of key areas. The group picture and accompanying caption presented herein indicate that this objective was accomplished.

Comprehensive Course on PT-100 Unit

The main course of instruction was devoted to the operation of the RCA PT-100 Theater Tv equipment. This equipment consists of two racks which are located in the projection room, a high-voltage power supply located near the projection room, and a projector unit which usually is mounted on the balcony face. This equipment is the

latest RCA design for theater Tv.

The RCA TP-100 projects a 15x20-foot picture on a beaded motion picture screen, special for theater Tv use. The equipment is designed so that video signals may be obtained via coaxial cable or air pickup. The course included:

Tv fundamentals: receivers, antennas, video amplifiers, synchronizing circuits, etc.

Instantaneous vs. Intermediate Film Systems

16- and 35-mm Tv Terminal Projection Equipment

Demonstration of RCA 16- and 35-mm Tv Terminal Equipment

Television Projection Optics

Description of RCA PT-100 Theater Tv Equipment

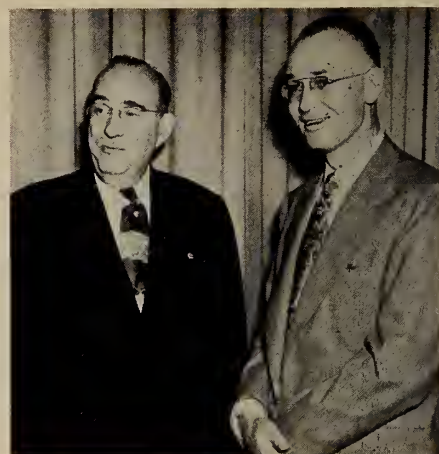
Block layout of PT-100 Equipment

Rack layout of PT-100 Equipment

Instruction in operation of PT-100 Equipment

Serious Application Cited

Each projectionist operated the equipment while a Tv picture was projected on the screen, and was furnished printed operating and installation instructions. Most of the instruction was held in the RCA Camden plant where the PT-100 system is in production. The RCA Theater Section formulated the course outline and material in collaboration with RCA Victor engineers.



Two presidents pictured at opening of IA-RCA special course for projectionists: the IA's Dick Walsh, and Ed Cahill of RCA Service Co.

A highlight of the week was a beef-steak dinner for both instructors and trainees as guests of Philadelphia Local 307, with Harry Abbott, IA vice-president and a trainee himself, acting as host.

The unanimity of opinion as to the course was summed up by Carl Johnson of the RCA Service Co., who said: "I never saw a course of instruction so enthusiastically received. The IA, the Locals and the trainees deserve much credit for the serious and earnest attitude displayed by every projectionist throughout the course."

FIRST CLASS OF IA PROJECTIONISTS GET CERTIFICATES OF ACCOMPLISHMENT AT RCA'S THEATER TV SCHOOL IN CAMDEN



Certificates of accomplishment were presented to (back row, left to right): E. L. Beaud, L. 293; New Orleans; Ray Monk, L. 154; Seattle; O. S. Keay, L. 219, Minneapolis; Joe Hovorka, L. 110, Chicago; Frank Rauffer, L. 316, Miami; Fred J. Raoul, L. 225, Atlanta; Clyde Shuey, L. 150, Los Angeles; Frank MacDonald, L. 199, Detroit; Harvey Slater, L. 223, Providence; Carleton Kinch, L. 396, Binghamton, N. Y.

Middle Row: Earl Small, L. 554, Lebanon, Pa.; Edward Fisher, L. 324, Albany, N. Y.; Frank Comerford, L. 182, Boston; John McNeal, L. 396, Binghamton, N. Y.; Edward Plass, L. 230, Denver; Lewis Howard, L. 162, San Francisco; Robert P. Burns, L. 110, Chicago; D. E.

Ball, L. 329, Scranton, Pa.; Victor Welman, L. 160, Cleveland; John Morgan, L. 170, Kansas City, Mo.

Front Row: Adam Schneider, L. 164, Milwaukee; Edwin Boppert, L. 273, New Haven; Alfred Savage, L. 143, St. Louis; Maurice Rudinkoff, L. 306, New York; Harry J. Abbott, L. 307, Philadelphia, and IA vice-president; Albert Edwards, L. 307, Philadelphia; William Santarsiero, L. 306, New York; Charles Daniel, L. 306, New York; and Harvey D. Hill, Sr., L. 249, Dallas. Walter Pettus, L. 224, Washington, D. C., completed the course but is not shown here. A second such course is expected to be organized in the near future.

Du Pont Photo Research Lab Opened at Parlin, N. J.

A new Du Pont laboratory devoted to research and development work in the field of photographic films and processes was formally opened at Parlin, N. J. on Sept. 29. The two-story concrete and brick structure, costing over \$1,000,000, represents an expansion in Du Pont's research on photo products.

Primary objectives of the studies to be pursued are improvements in color photography, better properties and performance in motion picture film, new development processes for both black-and-white and color film, and better products for the X-ray and graphic arts field.

Vital Role Played by Research

Crawford H. Greenewalt, Du Pont president, dedicated the new lab. He pointed out that it is one of a number of post-war research facilities out of which will come the products that will mark the future development of the company. He predicted that it will play an important part in the future of the photographic field, and added that 60% of the company's sales last year were of products that were unknown or in their commercial infancy 20 years ago.

The new building has no windows. Lighting throughout is indirect and temperature is controlled by air-conditioning equipment. Approximately one-third of the working space for research teams is maintained in almost total darkness to permit the handling of light-sensitive emulsions. Special piping systems carry developing solutions and fixers to the individual laboratory rooms.

Extensive Movie Film Facilities

Several rooms are specially constructed to simulate extreme conditions of temperature and humidity encountered in tropical lands and in the Arctic regions. Here the effects of climate upon new films and emulsions are studied.

A completely equipped motion picture projection room permits review of cine film quality by the research groups. Sound-recording laboratories provide for recording and testing the sound in motion picture films and magnetic tapes.

IA ELECTIONS

LOCAL 407, SAN ANTONIO, TEXAS

Genaro G. Garcia, *pres.*; Joe P. Cuevas, *vice-pres.*; Henry L. Villapadierna, *sec. treas.*; Horace E. Blanton, *rec. sec.*; Roy Cogdill, *bus. rep.*; Manuel Ayala, Phillip N. Wehrmann, *members at large.*

LOCAL 597, WACO, TEXAS

H. C. Fuston, *pres.*; E. F. Roberts, *vice-pres.*; Chas. J. Keeler, *cor. sec.*; A. M. Pudig, *fin. sec.*; H. F. Dunn, Sr., *bus. rep.*; J. F. Horne, *sgt.-at-arms*; J. G. Daniel, C. L. Holt, H. C. Yopp, *trustees.*



more

B.A.*

*(BOXOFFICE
APPEAL)

MOVIES
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THAN
EVER

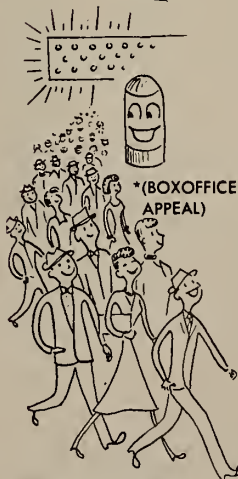
with **SUPER-SNAPLITE**
f/1.9 projection lenses

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Watch your "B. A." climb when you install Super Snaplite Lenses. Give your patrons the benefit of pictures at their best. You can't beat the Super Snaplite f/1.9 when it comes to putting a clear, sharp picture on your screen.

Super Snaplites give you a true speed of f/1.9 in every focal length up to 7 inches. Ask for Bulletins 207 and 209.

"You Get More Light with Super Snaplite"



KOLLMORGEN

2 Franklin Avenue
Brooklyn 11, New York

Optical



CORPORATION

SMPTE Test Reel for Tv Film Broadcasts

The necessity for solving the special and exacting problems incident to the broadcast by Tv of motion picture films required that the SMPTE produce in this reel one of the most significant and worth while contributions to the visual arts. The reel may be obtained by addressing the Society at 342 Madison Avenue, New York City 17.

THE poor results one sometimes notices when film is broadcast over a television set will be considerably improved if broadcasters take advantage of a new test film released recently by the Society of Motion Picture and Television Engineers. This is the first time that technicians in a broadcast studio can use recognized tests to check whether or not their film equipment is "on the target" and in best adjustment.

Use of the test film will help to eliminate from film programs much of the annoying edge-flare so often found in film transmissions, and will also improve the detail and tonal rendition, eliminating washed-out whites and extreme blacks from the film program material. The Society points out, however, that the quality of the reception in one's own living room may depend largely on the adjustment of the home receiver.

The film is the work of the Television Committee of the SMPTE which has been working for some time on detailed information to help in the production and use of films for Tv broadcasting. First, the committee compiled a report on "Films in Television" giving its analysis of what constitutes good practice in the production of films for use on Tv

medium frequency are the points checked by the film.

Use of the film will help the projectionist of a new station in setting up his equipment for the first time, as well as make it possible for him to check its "drift" from best adjustment. Each separate section can be run again and again or continuously as need be until each problem is under control. The film is not a laboratory instrument but is intended for regular use to check equipment in regular commercial operation.

Two Test Film Sizes Available

The complete film, available in either 16- or 35-mm widths, is made up of seven test sections and a selection of scenes. The test sections are a series of geometrical patterns, each one selecting some particular failing of the average Tv system. A variety of scenes typical of those which the telecaster is daily called upon to reproduce are included as a final check of the overall adjustment.

Alignment of Projector (Fig. 1)

The motion picture projector can be accurately aligned with the Tv camera

FIGURE 1

programs. Second, it provided Tv broadcasters with a test film as a guide in adjusting their film camera chains to best reproduce these films. The test film was

FIGURE 2

released generally in September, 1949.

Standard 'Targets'

The film provides standard "targets" which the Tv projectionist in the studio can run through his projector. If the "target" film is reproduced accurately

FIGURE 3

and clearly, the projectionist can be sure his equipment is aligned properly for clear transmission. If not, he can adjust it to correct the inaccuracy. Alignment, ability to reproduce shades of gray, storage of the electrical image to permit the

FIGURE 4

entire image to be scanned properly, control of brightness, and response of the Tv system to low frequency and to

by checking with this diagram. It shows the part of the projected film frame which is to be reproduced by the Tv system. The lines connecting the arrow shanks enclose the area that is reasonably well reproduced on most home receivers.

Low-Frequency Response (Fig. 2)

This test is made in two parts, each consisting of a half-black, half-white frame, with the dividing line horizontal. The first section has the black portion at the top of the frame; and the second is black at the bottom. These charts produced 60-cycle square wave signals. Serious tilting or bowing of the squares indicates incorrect low-frequency phase and amplitude response.

Medium Frequency Response (Fig. 3)

The response of the Tv system to medium frequency signals is of importance to picture quality. Horizontal bars are used in this test, first as black-on-white and then reversed. The bars have lengths equal in time of scanning beam travel to 2, 5, 12½, and 32 microseconds. These correspond to half-wave pulses covering an approximate fundamental frequency range from 15 to 250 kilocycles.

Correct medium frequency phase and amplitude response will be indicated by leading and trailing edges of the bars when viewed on the Tv monitor.

'Storage' Checking Chart (Fig. 4)

Present-day film pickup systems utilize short pulses of light which must be stored long enough to permit the charged

FIGURE 5

image to be scanned. Since the beam starts the scanning process at the *top* of the picture, the storage time required is maximum at the *bottom* of the picture. Some pickup tubes will suffer from leakage to the extent that the charged image may be seriously reduced in amplitude

FIGURE 6

by the time the beam reaches the bottom of the picture.

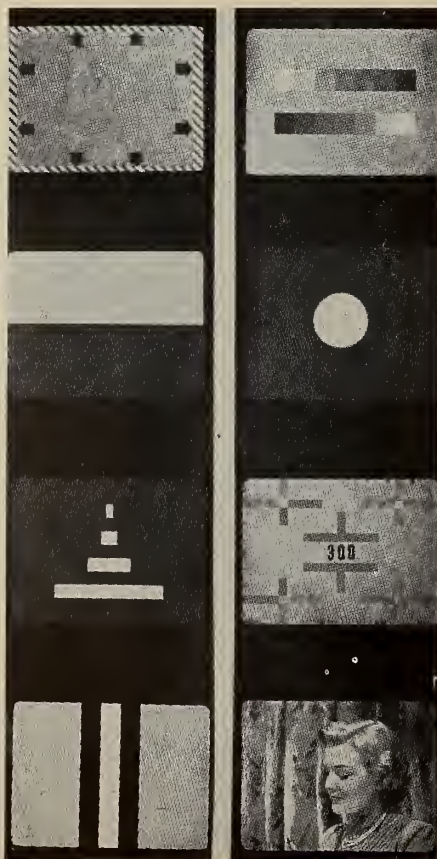
The chart which checks this is made up of vertical black and white stripes on a gray background. When viewed on the

FIGURE 7

wave-form monitor (set at field rate) this pattern will produce three lines representing white, gray, and black. Shad-

FIGURE 8

ing should be set to hold the gray line parallel with the blanking axis. If the white and black lines now tend to con-
(Continued, Col. 1, next page)



Film 'Dust' Battled by Kodak Studies via New Apparatus

A new method of determining the electrostatic charge on motion picture film may help projectionists in winning the battle against dust. Dust particles, attracted to film when it becomes charged with static electricity, have long been an enemy of the motion picture projectionist. For one reason, a dust speck is magnified hundreds of times when it appears on the screen.

But new apparatus and techniques developed by Eastman Kodak scientists for determining the charge on film may lead to defeat of the problem. The method is described in a paper by H. W. Cleveland of the Kodak Research Laboratories in the July, 1950, *Journal of the SMPTE*.

Electrostatic Charge Pickup

Basically, the problem is this: motion picture film—or any photographic film, for that matter—becomes electrified when rubbed or passed over rollers. The electrostatic charges thus generated attract dust and dirt particles to the film. The same thing happens when you stroke a comb rapidly through your hair. The

comb will then attract small particles of paper or dust by its electrostatic attraction.

The new device developed by Kodak is designed to measure accurately the electrostatic charge on photographic film. Using the apparatus, researchers can study properties of various materials used in film rollers to learn how much the film is electrified.

Important to the projectionist, however, are results of studies of various motion picture film cleaning materials

and methods of their use. Kodak used the new charge-measuring device in studies which show that film receives varying charges from different materials.

Charge Varies With Substance

Dry velvet, for example, does not appreciably change the charge of processed Eastman Plus-X Negative Film when rubbed on either the emulsion or support side. Velvet wetted with carbon tetrachloride will hold the film at a con-

SMPTE TEST REEL FOR Tv

verge, the pickup tube does not have ideal storage.

Transfer Characteristics (Fig. 5)

The ability of a Tv system to reproduce shades of gray is indicated in this section through the use of step-density areas. The first chart consists of a white area and a black area that serve as limit references, along with a centrally placed window in which the density steps appear.

Automatic Brightness Control (Fig. 6)

This test indicates the ability of the Tv system to follow changes in average illumination of a series of scenes. It consists of a white disc centered in a black frame which enlarges slowly to fill the whole frame. As the white portion becomes larger, the automatic brightness control should hold the black level constant.

Picture Resolution (Fig. 7)

Each of the five charts in this section is carefully calibrated in Tv lines to indicate the capability of the system to reproduce fine detail. Starting at 200 lines the charts change at five-second intervals until 600-line pattern appears.

Typical Scenes (Fig. 8)

To provide a qualitative check on the over-all results to be expected from good film, several scenes taken from material used specifically for Tv are included in the test reel.



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stant charge when rubbed on the emulsion side. But when it is rubbed on the support side, the film is almost completely discharged—and thus, less likely to attract dust particles.

The aforementioned paper also discusses the testing procedure in detail and supplies data on electrostatic potentials of several types of film rollers.

Cutback in Tv, Radio

Obviously the Korean war and the military preparedness program have added greatly to the increasing tube shortage. The new military priorities system, combined with the recently aggravated shortages of materials, will force a 20% industry-wide cut-back of Tv receiver production in the first half of 1951.

The priorities system will aid materially in production of electronics equipment for military purposes, but it will have an adverse effect on civilian items such as Tv and radio receivers.

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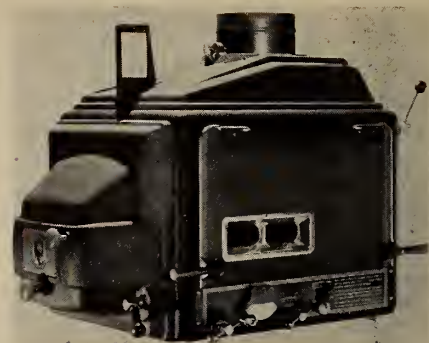
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The New 'National Excelite' 75-130 Amp. H. I. Arclamp

A new 75-to-130 ampere, high-intensity, reflector-type projection arc, known as the National Excelite, has just been designed for use by those large theaters and drive-ins with "king size" screens. The new lamp will be distributed through all National Theatre Supply Co. branches. Utilizing a rotating positive carbon, this lamp assures the utmost brilliancy for large-screen projection.

Low operating temperatures within the lamphouse are assured by a forced air system of cooling the positive carbon feeding mechanism, even when the lamp is burned at peak capacity. An exclusive crater positioning system automatically maintains the location of the positive arc crater at the exact focal point of the reflector.

The National Excelite employs a 16½-inch, F:1.9 elliptical reflector which matches the modern F:1.9 projection lens. The reflector holder and adjustment devices are an integral part of the rear door of the lamphouse, which swings open to facilitate easy trimming. The carbon trim is a 9 mm by 20-inch high intensity positive with a 5/16-inch by 9



The new 'National' Excelite high-intensity arclamp rated at 75-130 amperes.

copper-coated negative burned at from 75 to 90 amperes.

Provides Extreme Flexibility

The lamphouse and burner mechanism have been amply designed for the burning of larger carbons when available at up to 130 amperes, when the projector is provided with appropriate heat filters and/or other cooling devices. A bi-metal electronic tube automatically governs the speed of the separate motors which advance the positive and negative carbons.

Stable burning and complete combustion at the arc to avoid any black soot are attained by a jet of air directed just above the arc. White smoke, which would likewise cloud the mirror, is also directed away from the reflector by this air stream. Unit construction permits instant removal of the various lamp components for convenience in cleaning and inspection.

The massive lamphouse measures, in inches, 35 long by 24 wide by 28 high overall, resulting in a content of 14,000 cu. in. It is finished in black wrinkle with chrome trim and weighs 175 pounds. A brochure on the National Excelite will be sent to anyone contacting any National Theatre Supply branch.

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PROTECTING THE THEATRE—FIRST PLACE IN ENTERTAINMENT

SMPTE Screen Brightness Survey Underway in Six Areas

The Screen Brightness Committee of the SMPTE has already started the 100-theater screen brightness survey which has been under discussion for the last six months.* Task groups responsible for survey work have been set up in Los Angeles, New York, Philadelphia, Chicago, Toledo and Rochester. The first theaters visited were in the New York area, where it is planned to start with 30 indoor and two outdoor theaters.

The photoelectric instrument developed by the General Electric Co. has been checked to assure accurate measurements, and since there is only one in existence the survey will necessarily have to pro-

* "SMPTE Screen Brightness Survey": IP for July, 1950, p. 10.

ceed slowly at first. General Electric has agreed, however, to supply instruments for \$345 each, providing ten or more can be manufactured at one time. All likely customers are being canvassed, and it is hoped to have before long additional instruments available to survey teams.

Every means possible will be taken by those making the survey to avoid upsetting normal theater operation, and at least 24 hours' notice will be given any house it is proposed to survey. With the exception of about 15 minutes for making actual screen measurements, the remaining data can be gathered during the regular show.

Drive-In Theater 'Mostest'

Two more entries in the "mostest" drive-in theater sweepstakes are, first, Amos Kanaga, of San Mateo, Calif., who submits the following data anent the Geneva Drive-In operation in his territory: Throw: 514 feet; screen size: 61 feet wide; equipment: Motiograph projectors and sound system, Ashcraft Type

least from those in the 12 to 17 bracket. ARI said. Past studies by the organization have shown that movie-going frequency reaches its highest level among those in their late teens and early twenties, but early studies indicate that drive-in peak attendance is among those in their middle and late twenties.

Pattern for Infrequent Goers

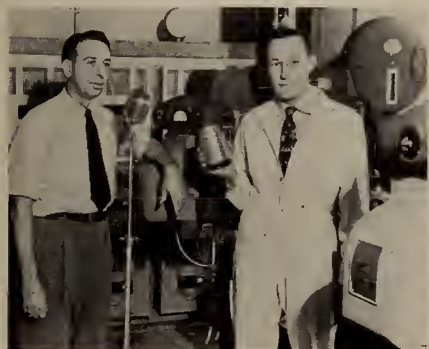
Draw of the auto theaters for infrequent movie-goers is indicated in findings showing that those who usually go to the movies less than once a week attend drive-ins once in every six times they go, as compared with only about once in 12 times for those who usually attend more than once weekly.

July drive-in attendance was least among persons in the largest cities—those over 500,000 population—where about one in 16 of all admissions were at auto-theaters. In small cities nearly one in five admissions were in drive-ins.

Ballantyne's Factory Space Upped to 35,000 Sq. Ft.

The Ballantyne Company, manufacturers of Royal Soundmaster sound and projection equipment for indoor and drive-in theaters, announces the second large factory addition to its plant in Omaha, Nebraska, within the past year—a two-story, 15,000 square foot addition—for a total of 35,000 square feet of floor space.

Founded in 1932, shortly after the advent of sound, Ballantyne built slowly during the 30's. In 1945 they moved to their new plant at 1707 Davenport St., Omaha, and it was anticipated that the plant would be sufficient for some time. However, during the post-war boom, and particularly during the past three years of drive-in theater equipment demand, the company has doubled its business three times over until their current pro-



John Turturici, business representative, and Carl Byman, both of IA San Mateo, Calif., Local 509, in the Geneva Drive-In Theater projection room.

100 arclamps using a 10-mm positive, 11/32 negative at 105 amps; lens: Bausch & Lomb 7-inch, F:2.0 Super-Cinephor.

RCA weighs in with news of the Double-Drive-In theater in Chicago, credited with projecting images 70 by 50 feet over a throw of 325 feet. Equipment includes RCA visual and sound units and Brenkert Superintensity lamps using 13.6-mm Hitex carbons.

Survey Shows Drive-Ins' Draw

Growing popularity of drive-in theaters is highlighted by an Audience Research, Inc., survey which found that the auto theaters in July drew one in eight of all movie-goers in cities over 10,000 population. Study also pointed up that drive-ins drew more women than men, while ARI surveys have consistently shown that as many film theater tickets are normally sold to males as to females.

Drive-in patrons are most commonly drawn from the 18 to 30 age group, and

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duction is approximately ten times that of 1945.

The new building will provide greatly increased space for research and engineering, as well as a greatly enlarged machine shop, painting and finishing department with new large infra-red baking ovens and a large assembly room for soundheads, projector bases, and amplifiers. One large section is being set aside for production of the new Model R projector, expected to go into production shortly after Jan. 1 next.

During the past five years, new prod-

ucts brought out by Ballantyne include the deluxe Model 8 soundhead, Model 4570 Lightmaster arc lamp, Model 1800 hi-tilt projector base, Model BW projector, MX Series complete drive-in theater amplification system, and the Soundmaster in-a-car speaker. A recent addition to the line is the new RX Series, low-cost drive-in theater amplification system. In 1949 and 1950, over 150,000 Soundmaster in-a-car speakers have been installed in drive-ins in the U. S. A

Technicolor's New Photo System

Technicolor has announced a new photographic system using the same amount of light as used in black-and-white photography. This new system, according to Dr. Herbert Kalmus, Technicolor prexy, really is a revolutionary advance and one of the major technical achievements in color cinematography.

Years of research and over a half-million dollars was appropriated to carry out the program of the new system. System will use a low level and unfiltered incandescents. New photographic devices and a considerably modified laboratory procedure are two of the new techniques employed. System is only operative with Technicolor three-component photography.

New system, Kalmus stated, means improvements in convenience, cost and quality of Technicolor pix and money saved by being able to shoot more scenes in a day. It will be four to six months before the new system is available.

BOOK REVIEWS

QUESTIONS AND ANSWERS IN TELEVISION ENGINEERING, by Carter V. Rabinoff and Magdalena E. Wolbrecht. 300 pages, profusely illustrated, appendix, index, French-fold circuit diagrams. Cloth. McGraw-Hill Book Co., Inc., 330 West 42nd St., N. Y. City. Price: \$4.50.

This ready reference covers numerous

questions on practical television problems similar to those posed in present Government examinations, as well as those which may appear in the future. It points up, in very readable style with simplified access of reference, the answers to the types of questions helpful in preparing for the first-class radio-telephone license examinations given by the FCC.

Clear, concise explanations, plus 152 easy-to-follow illustrations, answer a host of questions which are of the utmost practical significance to those who plan a career or who are intensely interested in television engineering. Provided are the solutions to scores of problems in the transmitting, designing, receiving and other phases of this rapidly-expanding art.


Of particular interest is a comparative discussion of modern television receivers, inter-carrier sound, dual focus, germanium crystal detectors, and selenium power rectifiers. The convenient question-and-answer covers all phases of the general theory in television, and the logical grouping of the questions makes this a useful volume for regular study as well as for readily accessible reference.

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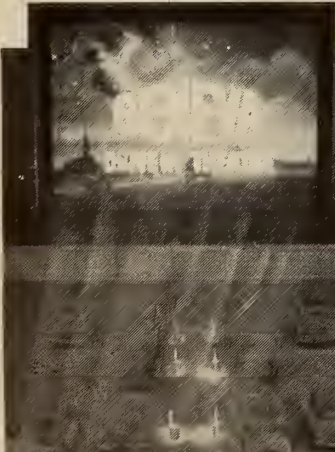
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SAFETY FILM PROJECTION

(Continued from page 23)

to be found among Technicolor films made in England.

An appreciable deficiency in the image clarity of black-and-white triacetate prints has been noted in many cases. Examination of samples leaves no doubt that poor photographic quality is the culprit more often than not, thus ruling out such causes as film-curl, buckling, etc. An investigation of nitrate prints has turned up similar examples of fuzzy pictures, a discovery which goes far to uphold the writer's belief that triacetate base is not to be blamed for intrinsically bad image definition on the film. Nor can the quality of the photographic emulsion (which is standard) be at fault. And the fact that there are triacetate black-and-white prints of high quality must not be overlooked.

Majors' Prints Less Satisfactory?

There is a vague indication that, on the whole, the black-and-white films issued by some of the smaller producing companies have better focusing qualities than those made by a certain few of the big companies. Why should this be? Do a few of the major producers "farm out" master positives or duplicate negatives to several processing laboratories in order to speed up and lower the cost of printing? It would be interesting to investigate the mechanics of a processing operation which permits the printing of release positives on the East Coast while the original picture and sound negatives are kept locked up in a film vault in Hollywood.

Whenever a projection print is only a

copy of a copy of a copy of the original camera negative, from 10 to 20% of the pictorial quality is lost. The result is a muddy picture having unsatisfactory tonal values and bad image definition. It looks out of focus on the screen because it is blurred on the film. The best lenses and lamps, the best screens, the most competent and painstaking projectionists are all to no avail.

And whenever an "economy wave" cuts down the lighting levels of studio sets, requiring the use of extremely fast camera lenses, depth of focus on the film deteriorates to the vanishing point. We repeat: if a sharp image isn't on the film, there can't be one on the screen.

Standards Level on Rise

Projection equipment is considerably better than it used to be, and projection technique, too, has improved with the years. The projectionist is becoming increasingly recognized as a skilled technician whose place cannot be taken by an untrained boy snatched off the street. All in all, standards of visual and sound performance, as far as our end of the game is concerned, have tended to rise to very high levels. The factors which militate against these theater standards are to be found cropping out now and then in the producing and processing part of the industry.

The processor gains nothing by passing defective work on to the exchanges; and the distributor gains nothing by disavowing his responsibilities. Time and time again the theaters are plagued by processing defects so serious as to create patron dissatisfaction. The writer has kept a record of such instances met with in his own experience. He commends the practice to other projectionists.

Splicing Acetate Prints

The severest criticism of triacetate release prints has been evoked by splicing difficulties. That these difficulties are real is doubted by no one who has any contact at all with the projection field.

Experienced projectionists do not need

to be told how to splice film. They already know. What is more, they know that the success of their shows depends on the excellence of their splices.

Less well known, however, is the reason why certain "double-purpose" film cements advertised as perfect splicing concoctions for all types of film work well enough on nitrate film but not on triacetate. Even the added precautions of scraping the clear side of the film and allowing a longer setting time do not

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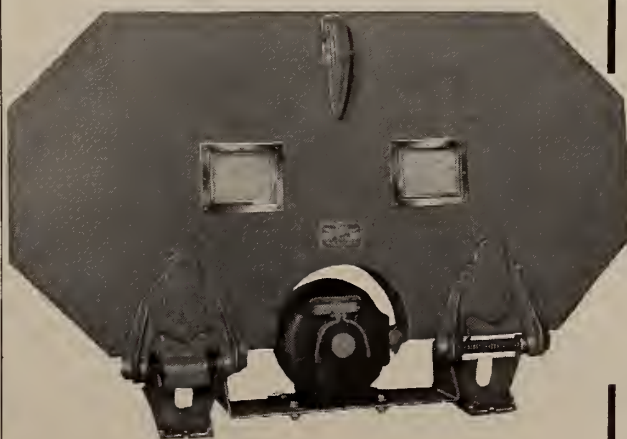
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seem to give entirely satisfactory results. No splice, let it be remembered, is a good splice unless it is a *permanent* splice. A film splice is not a join in the sense of two pieces of film glued together. It is an actual *weld*, the film-base substance of the overlapping stubs amalgamating. Any splice which will not outlast the life of the film is a bad splice, no matter how neatly it may have been made.

Various Cement Formulas

The extra work of splicing safety stock, together with the disagreeable uncertainty of the results, has imposed considerable hardship upon projectionists. If triacetate stock cannot be spliced satisfactorily—strongly, and with the ease with which nitrate stock can be spliced—then triacetate should be shown to the door, and nitrate invited to return. But, actually, triacetate film *can* be spliced strongly and with ease of working! The secret of success, or lack of it, lies in the formulation of the film cement used.

Eastman Kodak advises that one of

the very best solvents for triacetate base is a clear liquid called *dioxane*. This solvent chemical “cuts” triacetate base as easily as acetone cuts nitrate base. Dioxane cannot be purchased at the corner drugstore, however, for there is not sufficient demand for it. It is used only in industry, the technical trades, and in certain lines of scientific research.

Extremely important to the projectionist is IP's definite knowledge that very, very few of the double-purpose or safety-film cements now on the market contain this effective solvent. It is therefore advised that projectionists try out all available brands (including the cement made by the manufacturer of the film) and use only that cement which enables the very strongest triacetate splices to be made. A thorough and severe testing of all cements is worth the time and effort because the triacetate cements which are most in use are not necessarily the best.

Let us suppose that there are projectionists reading this who do not have many brands of film cement available to try out. Perhaps the ones they have been using are unsatisfactory. What to do? The following emergency advice is offered in the hope that projectionists in remote corners of the world may be helped out of a trying situation.

Go to the nearest drugstore or chemist's and buy 3 fluid ounces (90 cubic centimeters) of Glacial Acetic Acid and 1 fluid ounce (30 cubic centimeters) of Chloroform. Mix these two ingredients together in a clean bottle of suitable size, and then dissolve in the liquid 1 foot (30 centimeters) of clear triacetate film, well-washed and cup up into small pieces. When the film base has dissolved (which may take 15 or 20 minutes) the cement will be ready for use.

Observe Several Precautions

This triacetate film cement, if made of pure ingredients, will hold the film together with a grip that will never let go! The splices may be made as easily as nitrate splices. It is not necessary to scrape the clear side of *single-coated* films when using this cement. Both emulsions must be scraped from dupli-tized films, however.

It must be kept in mind that the above is *not* a double-purpose cement. It will *not* splice nitrate stock satisfactorily, nor is it good for nitrate-acetate mixed splices. No cement containing chloroform is suitable for patching nitrate film.

If dioxane is available, a truly double-purpose cement for *both* triacetate and nitrate films can be made by adding a little acetone to it in order to increase its solvent power for nitrate base. Mix 3 fl. oz. (90 cc.) of Dioxane with 1 fl. oz. of Acetone, dissolving in this mixture ½ foot (15 cm.) of nitrate and ½ foot (15 cm.) of triacetate film base. It's as

easy as that to make the best of double-purpose cements! The writer has no use for “secret formulas” and unstable, tricky mixtures that won't stand up under the test of hard usage.

For the sake of completeness, the most satisfactory nitrate film cement is given herewith. Mix 3 fl. oz. (90 cc.) of Acetone with 1 fl. oz. (30 cc.) of Isoamyl Acetate (Banana Oil), dissolving in this mixture 1 foot (30 cm.) of well-washed nitrate film base. This cement should *not* be used for splicing triacetate film!

Projectionists in Europe have had some difficulty getting ready-made cements which work well with triacetate film. Unable to purchase theater supplies from the United States, many of them have resorted to all kinds of home-made mixtures. Others have obtained commercial safety film cements from England which seem to give fairly good results.

Certainly not the least important of the measures required for the successful handling of triacetate release prints is the exercise of extreme care by the exchange workers. These diligent ladies might also give the matter of triacetate film cements a little thought. If the cements used in the exchanges are no good, it is the projectionist who must take the punishment.



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PROCESS PROJECTION FOR TELEVISION FILM

(Continued from page 8)

mission of approximately 70%. The "black" TransLux screens appear similar to the white in texture; however, they differ in that they are tinted to various densities with dyes. These screens exhibit light transmission factors in the range 40 to 60%.

All screens are roughened on both sides. The side with the coarse texture faces the camera, while the side with the fine texture faces the projector.

The relative merits of the white and

voltage can supply the required illumination. A more serious problem exists in increasing the illumination from a 16-mm motion picture projector. A 60-ampere carbon arc would be sufficient; however, improved methods of cooling the film will have to be devised.

Motion picture background projection in its present form was first used for Tv on Jan. 13 last on "One Man's Family." The motion pictures were photographed in San Francisco. One scene depicted a trip on a cable car, the other scene an automobile trip to and over the Golden Gate Bridge. A section of a streetcar was fabricated for the foreground upon which the live actors stood. In the case of the road scene, a section of an automobile was shown with the actors sitting facing the screen.

Slides are easily available from existing library material, or glossy prints or art drawings may be made into slides for still background projection.

Careful Footage Selection

In the case of motion picture background projection the footage must be chosen very carefully. The material available in most film libraries will be found to consist of broken continuity. Typical scenes last from 5 to 10 seconds, whereupon the continuity is broken to portray a new angle of view. This would be unsatisfactory for background projection since the effect of realism would be lost.

In the case of "One Man's Family," a

specially used motion picture camera was kept going continuously for 10 minutes. When the streetcar came to a stop the camera continued photographing the halted traffic and the pedestrians crossing the street. However, care must be used to preserve the correct proportion of the background material in relation to the anticipated live foreground actors. For example, a live actor standing 5 feet, 7 inches would appear ridiculous if the motion picture background portrayed individuals who were giants.

[CONCLUSION]

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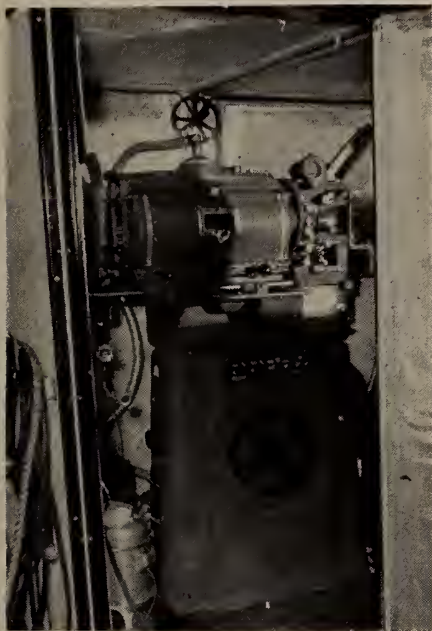
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Holmes Tv projector mounted in booth. Water-type vacuum cleaner for arclamp exhaust cleansing is seen below lamphouse.

black screens have not as yet been fully explored. Initial experience indicates that the TransLux black screen provides better contrast between highlights and shadows under conditions of spill light than the white screen.

The screens are fragile to the extent that they will tear if props, ladders, etc., are allowed to fall against them. Flying of the screens is recommended, but few Tv studios have sufficient overhead space to permit this procedure.

Improved Cooling Needed

The 9 x 12-foot size of screen is presently in use. There has been some indication that a size of 18 x 24-foot would be desirable for certain large shows. This larger size would present problems such as increased illumination, increased projection distance, greater screen storage hazards and a heavier frame construction.

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W4FGG Marvin Storler—L. 144
W4RFF Howard Ross—L. 574
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W5CQQ Rajmunt J. Machu—L. 597

W6BAA Amos Kanaga—L. 409
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W6ABF Martin Brown—L. 695
W6DYJ Ed Pothier—L. 215
W6IV Delos Trim—L. 297
W6RKB Bob Gillespie—L. 241
W6YWC Lewis Howard—L. 162
W6EFL A. H. Whitney—L. 150
W6EAQ E. L. Kline—L. 150
W6CAG August De Grazia—L. 150
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W6KNI Cliff Schwander—L. 150
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W6WPG Robert Hyde—L. 796
W6IDY Dom Lucido—L. 241
W6EP Leslie Hewitt—L. 695
W6HK Frank Creswell—L. 728
W6YDU C. R. Putnam—L. 490
W6BWI Harry Morse—L. 297
W6VTX Ralph Addy—L. 521
W6EIR Leroy Ward—L. 521
W6ZOK Max Miller—L. 521
W6FGV Norman Owens—L. 521
W6BEP C. C. Applegate—L. 187
W6WPG Robert Hyde—L. 796
W6ZEN Floyd McPherson—L. 709
W6FOP George Abrams—L. 297
W6AGN Arthur Hansen—L. 297
W6EWU Tom Wells—L. 297
W6YBC Hansen Cresap—L. 297
W6ZBX George Kiaser—L. 297
W6CZK Ray Baumann—L. 434
W6CML Tom Moore—L. 169
W6IYT L. H. King—L. 796
W6KCH H. H. Quackenbush—L. 510
W6GCF Charles Busby—L. 599
W6HUE Homer Elias—L. 599

W7LAT Fred Jones—L. 720
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W7AXY John Murphy—L. 91
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W7HE Dee Hart—L. 91
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W7GXN Edwin McMurray—L. 180
W7HJ Donald Johnston—L. 401
W7AVM J. Elmer Newell—L. 429

W8VDP Jack Harwood—L. 160

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W8WSL Denzel Murphy—L. 239
W8OWK Edw. Miller—L. 199
W8EEW Muriel Murtagh—L. 291
W8QIX E. W. McDonald—L. 199
W8BPK Jim Robinson—L. 64

W9NLP Rolly Long—L. 110
W9OL W. P. Atchison—L. 323
W9NPG John Bain—L. 323
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W9EDW Harold Nelson—L. 221
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W0GSW Jim Evans—L. 242
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W0UOP Clair Rockholz—L. 286
W0WSH Herschell Allredge—L. 443
W0DOL E. M. Karcher—L. 482
W0SJK O. S. Keay—L. 219
W0BTT R. R. Kerwood—L. 586

CANADA:

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VE3BAK F. Winkle—L. 173
VE3BVC E. H. Whyat—L. 173
VE3BWG Lou Lodge—L. 173
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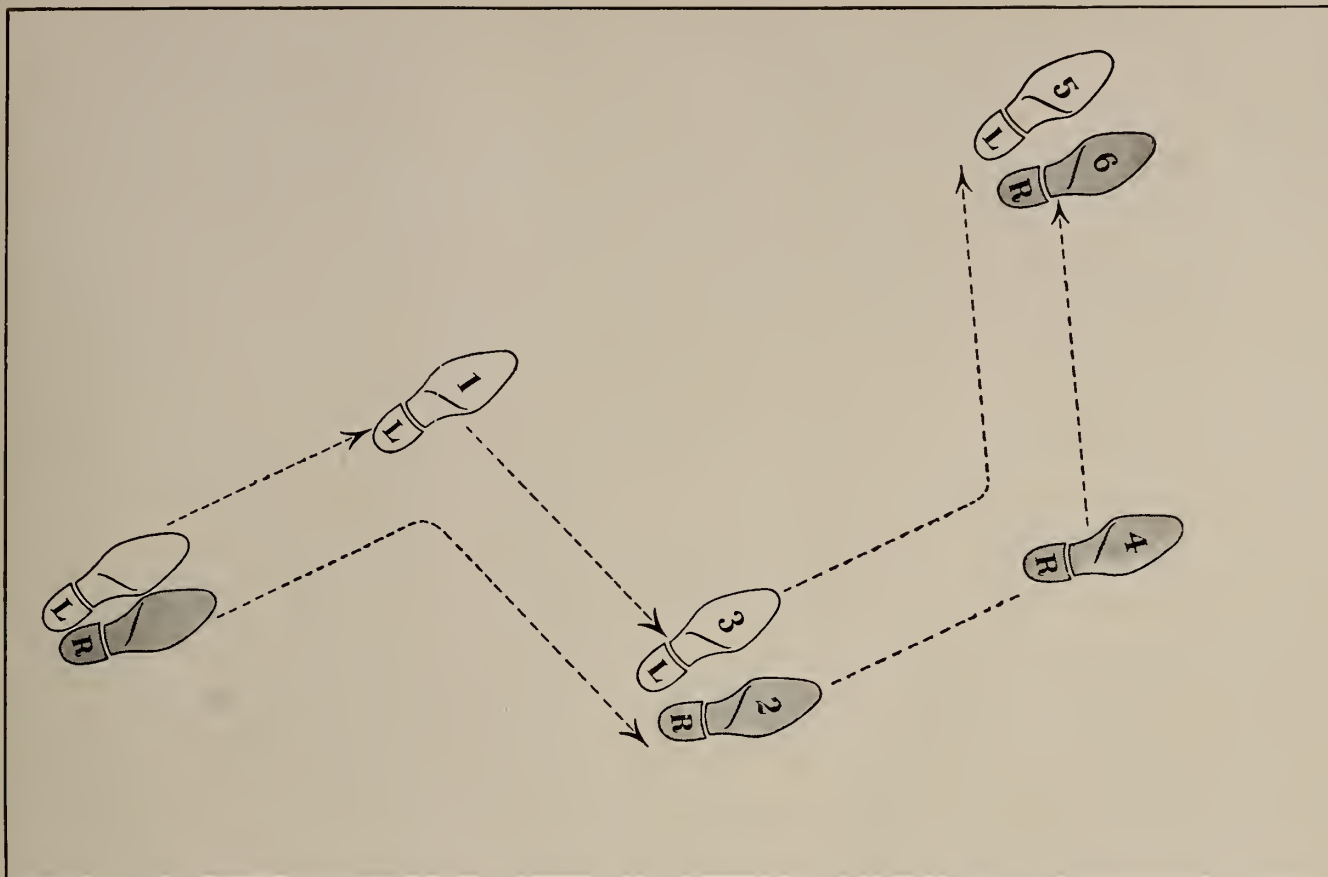
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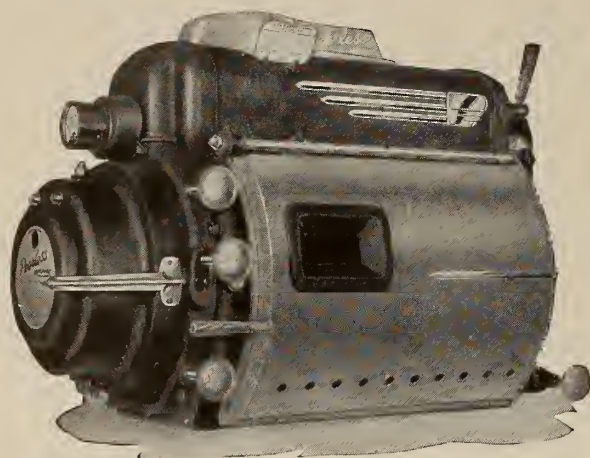
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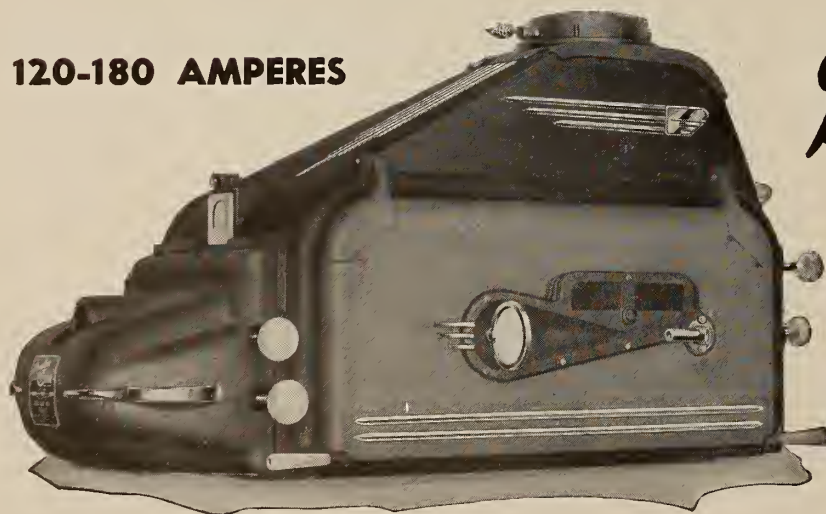
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HENRY B. SELLWOOD, *Editor*

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MONTHLY CHAT

MUCH talk and precious little positive action has marked the gradual, enervating spread of pessimism, engendered by slumping box-office receipts, within the motion picture industry for more than two years now. Countless speakers have mounted countless rostrums to deplore, to bemoan and to exhort—the while the very elements which, combined, promised quick curative action were obscured by a deep haze of aimless, unproductive oratory.

Said IP in this very space almost two years ago (Jan., 1949):

"If the film industry is to continue as a healthy economic organism, it appears certain that the life-sustaining energy must flow from its technicians. . . . Three-dimensional pictures, stereophonic sound and greatly improved color processes are but three of the advances long promised by the film industry; but it begins to look as though the Big Brass . . . have become very coy about putting money into technological developments in behalf of an industry which, while the source of their opulence and personal power, might possibly be in for a bit of rough going. . . ."

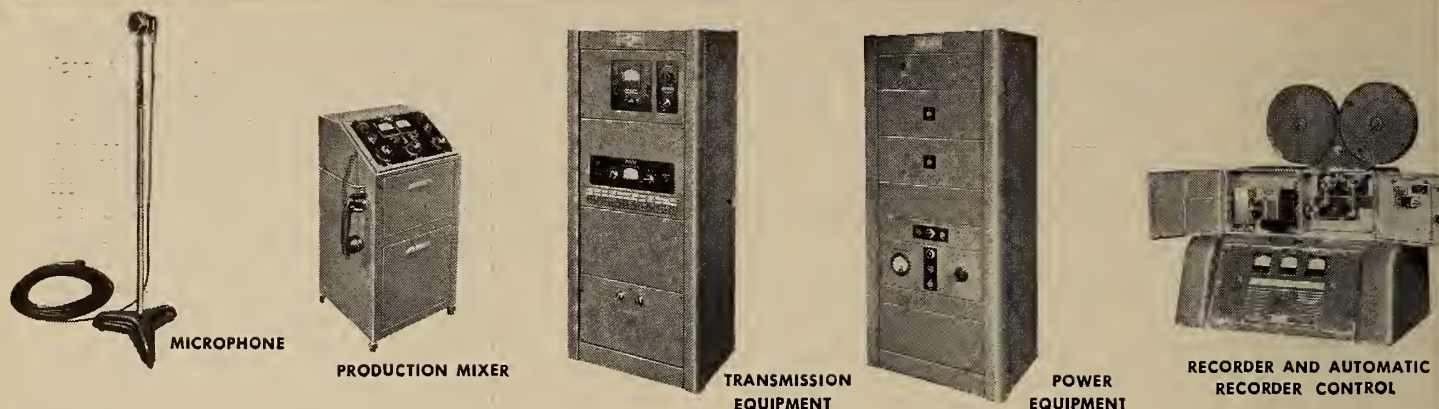
Upon reading which, an outstanding scientist of our time addressed IP as follows: "All the elements which you mention as having great recuperative value to the industry are now, and have been for several years, available to the film people for the past several years. None are so blind as those who *won't* see; and none so dead as those who *can't* think."

Now along comes the Cinerama system of visual and sound reproduction (page 10 of this issue) which, while not of world-shaking importance, contains within one compact package those elements which are capable of infusing new energy into the economic blood stream of the film industry. Of particular interest is that the basis for the Cinerama system (no less than for the establishment of a theater Tv network long 'ere now) was firmly established many months ago and needed only the sympathetic interest and financial support of the film industry.

Extremely critical of the Big Brass film peddlers and other "leaders" of the motion picture industry this corner has been, even as it may have been, unduly pessimistic as to the industry's future; but such harsh words as have been spread in this section are quite pallid as an effective means to describe our feelings now on the score of the degree of initiative and courage required of our "leaders" at this critical moment.

Boiled down, our advice to film company executives is this: Get your fannys out of hotel banquet rooms and out of the cabannas of Hot Springs, Palm Springs and Miami Beach and take positive action *now* on both theater Tv and the Cinerama system. If you don't it won't require Old Sol's powers to tan those fannys.

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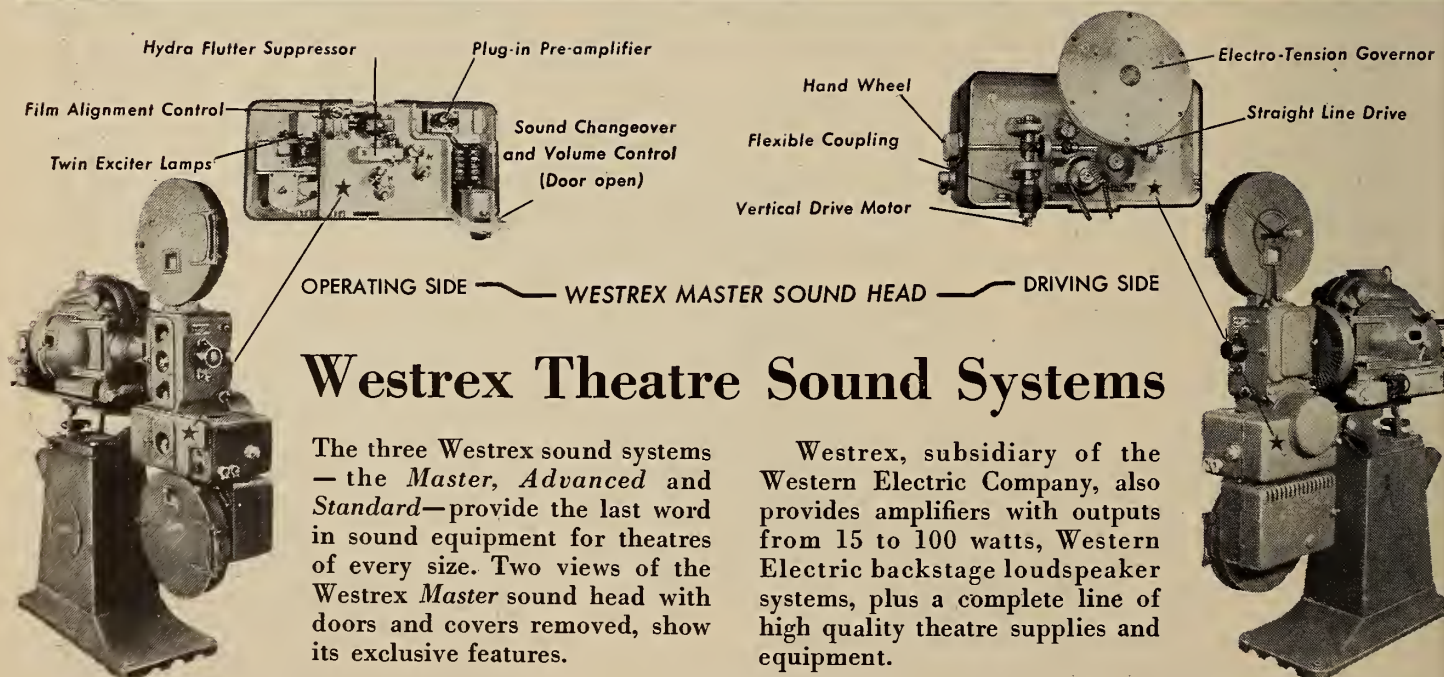
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Maintenance and Servicing of Motors

By ROBERT A. MITCHELL

I. Types of Motors

THE operation and maintenance of motors is a much more important part of the projectionist's work than the scanty treatment accorded the subject in most projection textbooks would indicate. In large theaters, the chief projectionist is responsible for the condition and performance of all motors—projector, the motor-generator, rewinder motor, projection-room ventilator motors, and the curtain-control and automatic-dimmer motors.

No projectionist therefore can afford to be without at least an elementary knowledge of motor principles and design. The electrical circuits utilized in the various types of motors are simple; and it is only the fact that one part of the motor circuit moves while the other part stands still that makes a motor seem complicated.

The revolving part of a motor requires extra care and attention because most motor troubles are of a mechanical nature. When a motor is run many hours each day, year after year, practically all wear occurs in the two bearings which support the rotating shaft and permit it to turn freely. Accordingly, it is easy to understand why most of the time spent in the maintenance of motors must be devoted to the care of the bearings.

Two Types of Bearings

Motor bearings are of two types: sleeve and ball. (The use of roller bearings is usually restricted to slow-speed shafts, as in reduction-gear motors.) Sleeve bearings are lined with an "anti-friction" metal, such as tin-base babbitt

or bronze. Each type of bearing requires careful lubrication.

Most sleeve bearings are lubricated with highly refined petroleum oil; while ball bearings require a special bearing grease. The use of Vaseline in a ball bearing is an invitation to trouble and will eventually ruin the bearing. Bearing greases, whether of the pure petroleum or soap-base type, is carefully freed from all acid substances which would corrode and pit the highly polished surfaces of the balls and their races.

Adequate lubrication of all motor bearings is absolutely essential; but, on the other hand, over-lubrication can be definitely harmful. Excess of oil in a sleeve bearing may seep through to the commutator, interfering with the electrical function of the brushes, or penetrate the windings, causing rapid deterioration of the insulation. In the case of a ball-bearing motor, an excess of grease may cause serious heating of the bearings.

The manufacturer's lubrication instructions should be carefully followed in every case. Some sleeve-bearing motors require a drop or two of oil every day; others once every week or month, depending on the size of the oil reservoir and freedom from leakage. Ball bearings should be filled about half full of grease. In some ball-bearing pro-

jector motors, grease is forced into the bearings with a small grease gun; in others, by giving each grease cup a half turn about once a month. As a rule, old grease should be cleaned from the ball bearings and the grease cups once a year and replaced with fresh grease.

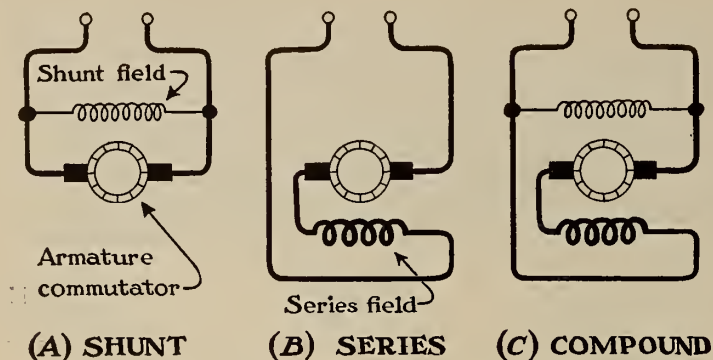
The commutator of a motor has both a mechanical and an electrical function. It is, in fact, a "sliding connection." And in nearly all single-phase A.C. motors we find centrifugal switches, the governors and contacts of which are mechanical parts needing periodic inspection and servicing.

Chief Electrical Components

The chief electrical components of any motor are two windings: one, the *stator*, mounted in the main frame of the motor; the other, the *rotor*, mounted on the revolving shaft. The stator and rotor of a direct-current motor are called, respectively, the *field* and the *armature*.

Associated with each of the two main windings are magnetic circuits intensified and properly directed by means of "cores" made up of laminations of soft iron. The iron, wherever it extends through the center of a coil, is called a "pole-piece".

The electrical condition of a motor depends upon the continuity of the stator and rotor circuits and the effectiveness of the insulation. Insulation which has deteriorated through the action of oil, water, or chemicals, or has been damaged by rough handling, overheating of the motor, or film fire, may be the cause of grounds and short-circuits sufficiently



serious to put the motor completely out of commission.

The condition of the insulation may be tested most conveniently with a "meggar" (megohm-meter), but even a simple circuit-testing device, such as an ordinary 110-volt lamp bulb connected in series with test prods, will often serve to track down short circuits, grounds, and open wires. The insulation in all motors used in the theatre should have a resistance of at least 1 megohm (1,000,000 ohms).

Preservation of Insulation

To preserve the insulation, all stator and rotor coils are painted with a special varnish and baked at 115° C. (239° F.) until dry. Glyptol, a coil-varnishing preparation which dries in air at room temperature, may also be used with good results. When overhauling motors for extensive repairs, repairmen often re-varnish the windings. But before varnishing can be carried out successfully, the windings must be thoroughly cleaned with cleaner's naphtha (Stoddard solvent), but not with carbon tetrachloride, a liquid which damages certain baking varnishes.

The data on the nameplate of every motor under the projectionist's care should be copied down in a notebook and kept handy for ready reference. This information will come in handy if ever a replacement motor is needed or new parts ordered.

Motors, like projectors, require periodic inspection to minimize the likelihood of breakdowns. Appended is a suggested outline for motor checkups.

INSPECTION SCHEDULE

ONCE A WEEK. Check the bearings. If sleeve bearings, apply lubricating oil if necessary. See that the oil rings are working properly, and that oil wicks and felt oil-retaining gaskets are in good condition. If ball bearings, test the temperature of each bearing by feeling with the hand. Listen to the bearings while the motor is running—clicking sounds indicate a cracked or otherwise defective ball. Check the temperature of the motor frame with the hand. A running motor

will feel warm to the touch, but should not feel uncomfortably hot.

ONCE A MONTH. Examine commutators, slip-ring collectors, brushes, brush-holders, and brush shunts (pigtailed). Rough or scored commutators need "truing" in a lathe or touching up with a commutator stone or No. 00 sandpaper wrapped over the end of a stick. High mica insulation between the commutator bars should be undercut with a slotting tool.

Short brushes should be replaced. (When renewing brushes, replace *all of them*, and use the type and grade of brush specified by the manufacturer.) See that the brushes are seated properly on the commutator or slip rings, and that the pigtailed are connected tightly and not accidentally grounded. Brush pressure should be checked every time the brushes are replaced or cleaned. (A small spring scale of the type used by rag buyers may be used to test brush tension. About 1½ pounds per square inch of brush surface is generally considered satisfactory.)

Check the action of the centrifugal switches and brush-lifting (or brush-lowering) governors of A.C. motors. Blow all dust and dirt from motor with a hand bellows.

ONCE A YEAR. Check air-gap (distance between rotor and stator poles) by means of a feeler gauge, taking readings at top, bottom, and both sides. The gap should be the same all the way around; and it is more critical for A.C. than for D.C. motors. A displaced gap is corrected by shimming the bearings or replacing worn bearings. Measure insulation resistance with a "meggar."

If the motor has been giving trouble, check all circuits, read line voltage with a voltmeter, and line current with motor running with an ammeter. Drain and replace oil in sleeve bearings; clean out grease from ball bearings and refill. Check end-play of motor, allowing sufficient play in large sleeve-bearing motors for the rotor to "float" in the magnetic field of the stator.

EVERY TWO YEARS. Dismantle the motor and clean it. Check bearings for

wear. See that all windings are tight, and replace loose wedges and armature bands. Clean stator and rotor coils thoroughly with Stoddard solvent, dry, and paint with baking varnish.

The projectionist will find maintenance comparatively easy if he understands the basic ideas involved in the different types of motors. For this reason the more common types of D.C. and A.C. motors are briefly described before presenting detailed trouble-shooting charts.

SHUNT MOTORS

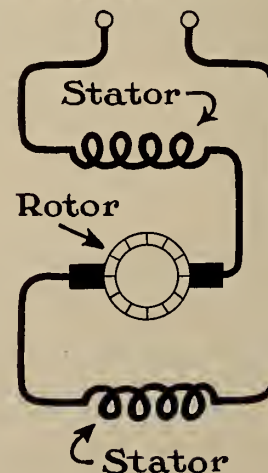
All motors operate by virtue of magnetic attractions and repulsions which impel rotation of the rotor.

There are three types of D.C. motors, viz., *shunt*, *series*, and *compound*. These terms refer to the manner in which the field (stator) coils are connected with the two brushes which provide the armature (rotor) with current. The commutator upon the face of which the brushes rest consists of a large number of copper bars separated by thin sheets of mica insulating compound. Each segment, or bar, of the commutator has a lead-wire which taps the armature windings.

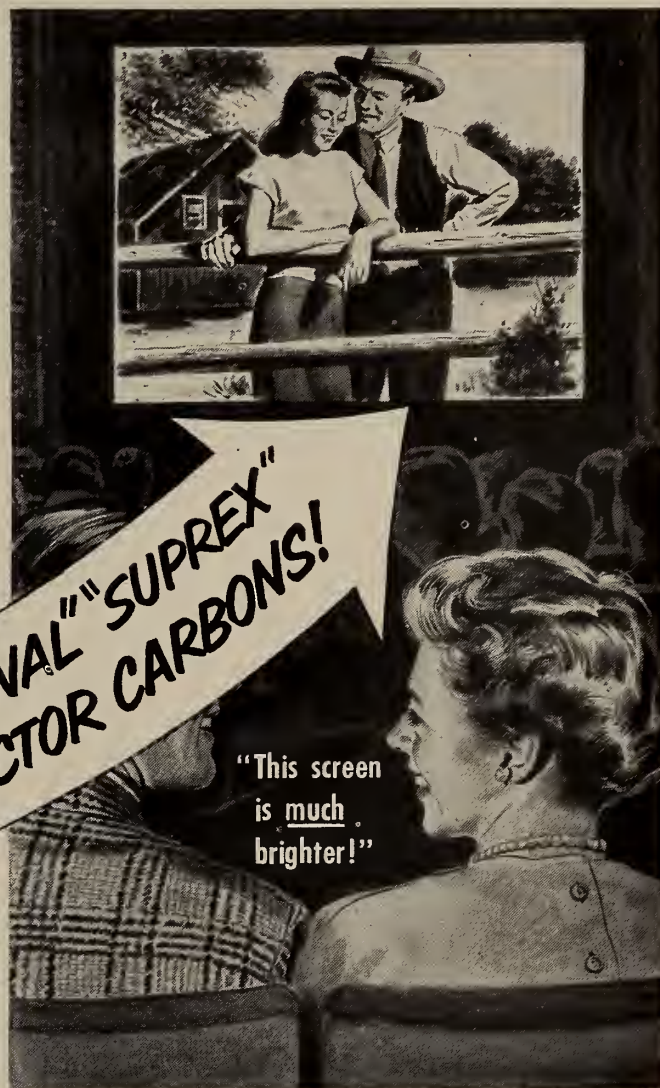
The field construction of most fractional-horsepower D.C. motors utilizes only 2 or 4 magnetic poles. Each pole-piece has a coil of wire wound upon it; and all the coils of any one circuit are usually connected straight through in series.

In order to obtain the most efficient and sparkless commutation in any D.C. motor, the brushes must rest on the commutator at "neutral point". Under variations of load, however, the neutral point shifts around the commutator, causing sparking at the brushes. So in order to neutralize cross-magnetization of the armature, and thus minimize the troublesome shifting of the neutral point, small poles called *interpoles* are sometimes placed between the main poles of

FIG. 2. A "universal" A.C.-D.C. motor.



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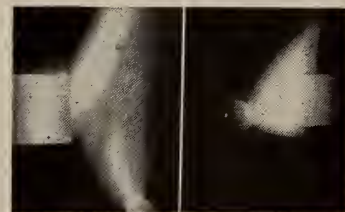
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the field. Interpoles are always connected in series with the armature.

In certain very large D.C. motors the stabilizing action of the interpoles is assisted by additional windings on the main poles. These extra windings, called *compensating windings*, are also connected in series with the armature. Since any type of D.C. motor—shunt, series, or compound—may have interpoles and compensating windings to improve performance, these brief remarks will suffice.

'Torque': Force of Rotation

The electrical hook-up of a shunt motor is shown in Fig. 1A. It will be noted that the field and the armature are connected in parallel (shunt). This motor is characterized by rather low "starting torque" and by a tendency to run at constant speed under variations of load.

The word *torque*, often used in discussions of motors, refers to the value of the *force of rotation*.

It should be kept in mind that Fig. 1, as well as the diagrams to follow, is not a picture of a motor but only a simplified representation of the electrical circuits actually used in motors.

SERIES MOTORS

These differ from shunt motors in the fact that the field coils are connected in series with the armature. Because all of the current consumed by the motor must pass through the field windings, these coils are wound with heavier wire than shunt field coils. Fig. 1B illustrates the series hook-up.

Series motors, in contrast to shunt motors, have a rather high starting torque, thus they are able to start under heavy loads. But varying loads cause the speed to vary over wide limits, hence the unsuitability of series motors for many purposes. (They find their widest field of application in street-cars, subway, and other D.C. electric trains.) A series motor running without load may go so fast as to fly apart.

Both shunt and series motors develop torque by the attraction of "unlike" magnetic poles and the repulsion of "like" poles. A "South" armature pole,

for example, is strongly pulled by a "North" field pole. But when this pole of the armature has reached the mid-point of the North magnetic field, the commutator has turned under the brushes far enough to cause a reversal of part of the armature current. The South armature pole then becomes North, and is repelled by the North field pole. This gives the armature an added push. A rapid repetition of these pulls and pushes all around the armature results in continuous rotation.

COMPOUND MOTORS

This is a combination shunt-series motor. The series and shunt fields are shown separately in Fig. 1C; in actual motor construction the two fields are wound together on the same poles. Compound motors have excellent starting torque and a constant-speed characteristic within reasonable load limits. Such motors therefore have the good features of both shunt and series motors.

Speed regulation in shunt and compound motors is accomplished by interposing a rheostat in the shunt field. Decreasing the shunt-field current causes the motor to run faster; increasing it slows the motor down.

The direction of rotation of any D.C. motor may be changed by reversing either the current through the field, or the current through the armature. (If both currents be reversed, the motor will run in the same direction as before!)

In all normal compound motors the current flows in the same direction through the shunt and series field coils. In the "differential" compound motor, however, the shunt and series fields oppose each other to provide good speed regulation under very large variations in load.

UNIVERSAL A.C.-D.C. MOTORS

The circuit of this type of motor is shown in Fig. 2. It will be seen at once that this is a series motor. The principal difference is that the universal motor has laminated pole-pieces, eliminating power-robbing, heat-producing "eddy currents" in the frame and pole-pieces.

Universal motors have somewhat dif-

ferent load-speed characteristics on D.C. than on A.C. On A.C., inductive effects cut down the amount of current consumed by the motor, reducing speed and torque below what they are when the motor is run on D.C. of the same voltage. Universal motors are used on drills, hair-driers, vacuum cleaners, sewing machines, cake mixers, and other small appliances.

The speed of universal motors, like the speed of D.C. series motors, is varied by interposing a rheostat in the line supplying current to the motor. The lower the voltage, the more slowly the motor runs.

SYNCHRONOUS MOTORS

This type of motor works only on A.C. In fact, the frequency of the line current is one of the two factors which determine the speed at which a synchronous motor runs. The other factor is the number of poles in the rotor (which functions as a revolving field in this type of motor).

$$\text{R.P.M.} = \frac{\text{Cycles} \times 60 \times 2}{\text{Number of poles}}$$

The inset in Fig. 3 illustrates the principle upon which a synchronous motor operates. If 60-cycle current is fed into the stator winding, the polarity of the resulting magnetic field will change from North to South and back to North 60 times a second. The rotor of this demonstration motor is nothing but a pivoted bar magnet. The motor will not start itself; but if the rotor is given a vigorous spin, it will continue to revolve at 60 revolutions per second (3600 r.p.m.) as long as 60-cycle A.C. passes through the stator.

Except for small clock and phonograph motors, all synchronous motors are made for operation on polyphase (2 or more phase) A.C. The advantages of polyphase current are obvious. Single-phase current produces a *fluctuating* magnetic field in the stator, but polyphase current produces a *rotating* magnetic field which drags the rotor along until it attains synchronous speed—the speed at which it is "in time" with the alternations of the current. In other words, a polyphase synchronous motor (diagrammed in Fig. 3) is able to start itself.

Magnetization of the Rotor

A word now concerning the magnetization of the rotor. Ordinary magnets would not be powerful enough for a large motor, so electromagnets are used instead. These electromagnets must be supplied with D.C., and are therefore connected, through slip rings, to a small dynamo called an "exciter". It is easy to see why slip rings are used. A regular commutator periodically reverses the

(Continued foot of next page)

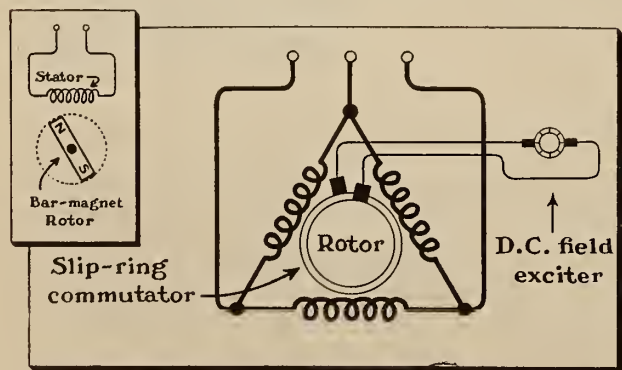


FIG. 3. Three-phase synchronous motor. The inset illustrates the principles involved. When the "magnet rotor" is spun rapidly, it will continue to revolve in step with the fluctuations of the A.C. energizing the stator coil.

NBFU Classifies Safety Film

Official Communication from the National Board of Fire Underwriters Discusses Comparative Characteristics of Nitrate and Acetate Film Stock

FOLLOWING an extended investigation, acetate base film in the form of ribbon for motion pictures was listed by Underwriters' Laboratories, Inc., as slow-burning, the fire hazard being classed as somewhat less than that of common newsprint paper in the same form and quantity. Motion picture safety film having a cellulose acetate base is now being marketed for commercial and general use. It is claimed that this film has a greater projection life and is otherwise superior as compared to the older type of cellulose acetate film.

This type of film may be identified by the words "Safety Film" printed at frequent intervals along the edge. In case of doubt, acetate film may be distinguished from nitrate by a burning test, using only a small piece of film, and burning it in a room where there is no film and no fire hazard. Nitrate film will burn fiercely; acetate film will burn quietly.

Comparative Ignition Temperatures

The ignition temperature of cellulose acetate is between 700 and 800° F., as compared to about 300° F. for cellulose nitrate. A temperature of about 500° F. is required to produce the decomposition of cellulose acetate film. In the neighborhood of this temperature the evolu-

tion of fumes in material quantity occurs. These fumes are irritating and suffocating, but not considered to be toxic under most conditions.

The decomposition of cellulose acetate film, once started, does not continue except under conditions where there is an external source of heat. On the contrary, in the case of cellulose nitrate film the decomposition continues when once started, even in the absence of external source of heat.

This difference of decomposition is, therefore, of great importance from the fire and life hazard standpoint. Furthermore, great volumes of explosive and toxic gases are given off from decomposition of nitrate film, especially in a restricted supply of air, thus contributing to the life and fire hazard.

Slow Combustion Vital Factor

The rate of combustion of cellulose acetate film is relatively slow and the amount of heat evolved is of a low order, being much less than that of paper or wood.

The most important safety factor with reference to cellulose acetate film is in its slow combustion, and any fire can be easily extinguished by the application of water or smothering, much in the same manner as fires in ordinary combustible materials.

The time will, no doubt, come when nearly all pictures will be on safety film; but there may be nitrate films in circulation for some time, and because of this every precaution should be taken to avoid any relaxation in the regulations prescribed and methods imposed for the safe handling of flammable nitrate films.

Separate Storage Facilities

The safety factor supplied by the new acetate film can be taken advantage of by arranging its storage apart from any nitrate films. By this segregation, loss possibilities will definitely be reduced, and as nitrate inventories are progressively diminished their isolated confinement will tend to further control hazard possibilities.

In existing film exchanges, this segregation can be readily controlled by having separate film vaults for safety and nitrate films, and marking their doors with the words Safety Film in *green*, or Nitrate Film in *red*. Similar isolation of safety films from nitrate films can also be practiced using specially identified rooms for the safety film with such meas-

ures for protection against loss as may be desired.

Small amounts of safety film can be appropriately stored in ordinary steel filing cases, but if they are of high value specially protected cabinets of the type designed for film storage should be given consideration.

Positive Identification Needed

In order to insure the degree of safety now provided by the new film it is suggested that all safety films be unmistakably identified by reel bands bearing in prominent letters the words SAFETY FILM printed in bright *green*. All record cards and other control items that pertain to these films should also be printed in the same green color and bear as their main feature the words SAFETY FILM.

In contrast, all flammable nitrate films should be equipped with reel bands printed in bright *red* with the words NITRATE FILM, with their record items correspondingly identified.

Film-handling personnel working under this plan for segregating the two types of film should take special care to prevent intermixture of the two types, and there should be exacting supervision of storage facilities to minimize all possible loss. By positive and intelligent management the safety factor provided by this new film base can immediately benefit all engaged in motion picture film activities.

If such a plan for careful segregation is not followed, any place where both types of film are handled should follow for all film the safety precautions prescribed for nitrate film.

New Kodak Flexichrome Booklet

A new Kodak Color Data Book describing the Kodak Flexichrome Process has just been announced. The publication, 40 pages with six pages in full color, provides complete working instructions for the process, together with details of special applications. It includes not only suggestions helpful to the beginner, but also valuable guidance for the advanced worker.

The text for the new Data Book is divided into the following sections: The Process in Brief; Materials and Equipment; The Negative; Making the Print; Coloring the Print; Suggestions for Coloring; Surface Coloring; and Special Applications. Punched to fit the Kodak Color Handbook, the booklet is available at 50 cents per copy from all Kodak dealers.

Dr. H. L. Bohm Dies in England

News note from England: Dr. H. L. Bohm, formerly of the German UFA organization and who visited the United States in the early days of sound picture development, was killed recently in London when he fell in front of an underground train. His colleagues regarded Dr. Bohm as an outstanding worker in the technological arts.

MOTOR MAINTENANCE

(Continued from preceding page)

flow of current, but a slip-ring collector allows unchanging D.C. to be fed to the rotor electromagnets from the exciter.

The most noteworthy feature of synchronous motors is the fact that they must revolve in exact synchronism with the alternations of the line current fed to the stator coils. If an excessive load or a sudden voltage drop causes them to slow down, they will grind to a dead stop. Unless the exciting dynamo is cut out, the induction of powerful alternating currents in the rotor may damage the motor or the exciter. Serious accidents of this nature have occurred with large synchronous motors.

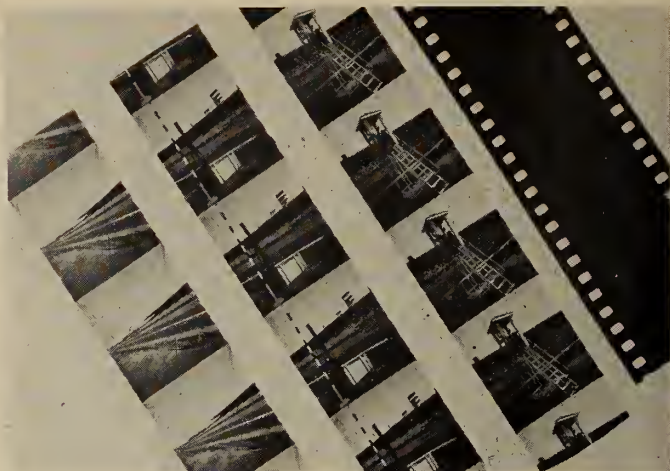
Synchronous motors are seldom used in the theatre, but one or two soundhead manufacturers have made 3-phase, 1/4 H.P., 220-volt synchronous projector motors. Such motors are likely to be troublesome in this application, and offer no advantage over constant-speed induction motors.

[To be Continued]



Field equipment for making super-movies (at left) consists of Cinerama camera and portable sound recording outfit. Latter uses six standard microphones spotted at strategic pickup locations.

At right: Put these four films together and you have a Cinerama movie. First three form left-hand, center, and right-hand parts of picture, when projected side by side on theater screen. Dark film



Photos by Popular Science

at right carries 6 sound tracks that actuate theater's loudspeakers. Picture frames are one-half again standard height. To make them, camera advances standard 35-mm film 6 perforations at a time, instead of the usual 4. Magnetic-type 35-mm soundfilm, with opaque coating of iron oxide, needs no laboratory processing and can be played back immediately. Cinerama—the movies of tomorrow.

Cinerama: Super-Movies of the Future

REALISM *par excellence*, thrills that either lift you right out of your seat or set you stiffening against its back, panoramic sight and sound which makes you an integral part of the action unfolding on the screen—these are the bases of the new Cinerama system of super-movies which might well provide the motion picture theater with the blood transfusion which is so badly needed to arrest, possibly reverse, the galloping anemia which now afflicts the movies' economic body.

So intense is the feeling of realism transmitted by Cinerama that not a few viewers are overcome physically—the genteel term is “nausea” or “seasick”—and are compelled to leave the auditorium hastily. Cinerama pictures are expected to make their first public bow late this year, with arrangements for permanent installations in theaters pointed at 1951.

Three-Dimensional Image Aspect

Cinerama is the brainchild of Fred Waller, formerly with Paramount Pictures, and designer of the famous Waller Gunner Trainer which utilized a five-lens camera and five projectors to show airplanes realistically on a curved screen. The Cinerama three-lens system is a simplified modification of the earlier set-up. The sound recording and reproduction system was engineered by Harold Reeves, of Reeves Sound Studios (N. Y. City) who compiled an impressive record for electronic tricks during World War II.

Cinerama's sponsors do not claim that their pictures are stereoscopic or three-dimensional movies, that is, in the strict technical interpretation of these terms. Such films require either a special screen that only a *limited portion* of an audience can view from a precise rigid-necked angle,^{1, 2} or the use of analyzers or special spectacles. No such extraneous gadgets are needed by Cinerama audiences, who view the screen images in wholly normal fashion.

Normal binocular (two-eyed) vision, while playing an important role in the viewing of motion pictures, is only part of the over-all reason why such images seem real. Cinerama starts from this basis and, by skillfully combining other elements of human vision and intricate compensatory optical and mechanical equipment, produces what is substantially a stereoscopic effect.

In real life one can look all around as well as straight ahead; and the Cinerama big “wrap-around” screen of 8 times standard size and 4 times as wide forms a great curving arc across one's field of view that surrounds the onlooker with the action and gives one the feeling of being right in the midst, not outside, of things. Images in closeups appear so near and so real that one feels he could reach right out and touch them. This

impression is achieved by the picture-taking lenses that match the human eye in focal length and give exactly the same perspective.

Truly Stereophonic Sound

Nor is the eye alone subjected to this amazing simulation of reality. Truly stereophonic sound positions the sound at exactly on the point of the screen from whence the sound emanates, even from behind the viewer.

The filming and projection of Cinerama movies represents a prodigious feat of planning and execution—everything is on a grand scale. The eye-filling picture covers a field of vision about 146° wide and 55½° high—which compares with the extreme limit of human eyes of 160° by 75°. Even the most satisfactory wide-angle lens couldn't possibly accommodate more than a fraction of this sweep, thus the reason for Cinerama's three-cameras-in-one.

The eyes of this 150-pound camera are three matched lenses of 27-mm focal length set at angles 48° apart. Each lens records one-third of the total width of the scene upon one of three standard 35-mm films carried in as many film magazines. Otherwise, the three sections operate as one.

Simultaneous Tri-Focusing

The lines of sight of the three lenses converge and cross at a point 11/16 inch in front of them, where a single revolving-disc shutter serves them all, thus as-

¹ “Russia's Three-Dimensional Motion Pictures,” by S. Ivanov; IP for April, 1941, p. 12.

² “Startling Soviet Stereo Films”; IP for December, 1947, p. 17.

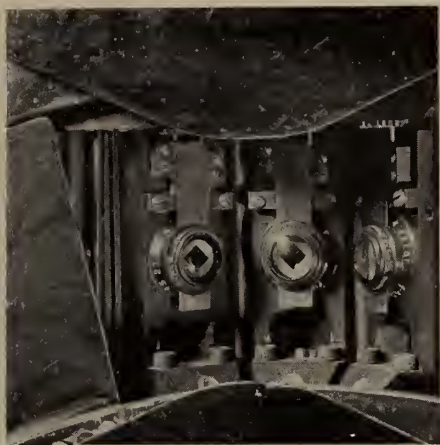


Photo by Popular Science

Cinerama camera system puts scene on 3 films, each making up one-third of the final picture. Closeup shown here is practically actual size of camera's 3 lenses positioned 48° apart which photograph scene simultaneously on 3 separate films. Their lines of sight cross at a point just in front of them, where a single revolving disc (left) serves as a shutter for all lenses.

ensuring synchronization of exposures. Simultaneous focusing of all three lenses is accomplished by a single knob; while another knob controls the diaphragm settings in unison.

Individual Cinerama film frames are one-half again standard height; and since three film strips are used, this means that the total amount of film used is $4\frac{1}{2}$ times as much as for a standard 35-mm motion picture.

After the camera has dissected the scene into three parts, it remains for the theater's projection system to put the parts together again. This requires three projectors instead of the customary single one. Installation of these booths and of the large curved screen will adapt existing theaters to show Cinerama films.

Projection Angles Match Cameras'

From angles like those of the camera lenses, the projectors throw the three sections of the picture side by side on the screen. The center section of the screen is curved, usually on a 25-foot radius, and two flat wings are tangential to this curve. The depth of focus of the projecting lenses is great enough so that the curvature of the screen presents no problem.

An innovation in each projector is a mechanical device nicknamed a "gigolo," because it jiggles up and down. Just as a photographer makes a vignette, this mask with a saw-tooth edge moves along the border of a film, so that the picture gradually fades from view at its edge. Thus adjoining films blend together on the screen without a conspicuous dividing line.

For realistic sound effects, 6 microphones in the field make individual tracks

on a single 35-mm soundfilm used for this purpose alone. Theater speakers, arranged in the same pattern as the microphones, are individually operated by the sound tracks. This produces the striking "sound-perspective" illusion that makes voices and music come from the right directions. A favored technique places 5 microphones and speakers, respectively, in a row across the full width of the movie set and the theater screen. The sixth microphone is put some distance behind the camera and picks up "off-stage" sounds, reproduced in theaters by a speaker at the rear of the audience.

Magnetic Sound Recording

Recent strides in magnetic recording have led to the choice of magnetic-type sound film, which needs no laboratory processing and can be played back at once.

Like conventional movies in their infancy, the preview films are not entirely free of technical faults: for example, straight lines are distorted by certain camera angles, which must be avoided. As the sponsors point out, these are experimental films, which will be bettered as the possibilities and limitations of the novel technique are more fully explored.

Estimates as to the cost of Cinerama equipment installed in a theater range from \$15,000 to \$50,000 per set-up, and although no figure has yet been named by Cinerama sponsors pending further development work, it is likely that the established price will lie somewhere between these extremes.

Typical of the non-technical person's reaction to the Cinerama system are the



Photo by Popular Science

Curved screen for Cinerama system has end sections of vertical ribbons, arranged like slats of Venetian blind. This eliminates reflection of light from ends to center of the concave screen, which detracted from clarity of picture there when ordinary screen material was used.

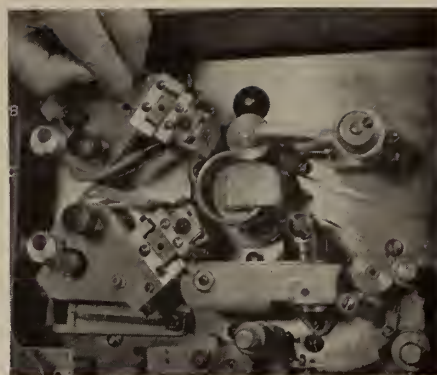


Photo by Popular Science

Sound recording Cinerama system puts everything picked up by 6 microphones on a single magnetic-type film. Mechanism shown here has (under finger) recording heads arranged in 2 banks of 3 each, which are actuated by pickup of 6 microphones. Film has 6 soundtracks. Similar system is used for reproduction.

following excerpts from a column by Robert Ruark, widely syndicated Scripps-Howard writer:

Typical Layman's Reaction

"I have just looked at the movies' answer to television, whether the movies know it or not. . . . Its introduction into the average movie theater is as inevitable as the adoption of sound pictures. . . .

"As many fusty movie moguls hated the idea of the switch-over to sound, so are they cold to this new type of projection. But today many theaters are also installing massive Tv equipment, with an eye to buying rights to big special events, for which they will block free showing on normal Tv channels and for which they will charge admission. They are already frantic about Tv inroads and figure to become more so. This is when you will get the modern miracle of the movies."

Ruark may be right; but the motion picture crowd will have to snap out of its coma to prove him so.

New Tube Substitution Book

Problems arising from the current tube shortage are simplified by a new book, "Receiving Tube Substitution Guide Book," by H. A. Middleton, just published by John F. Rider, 480 Canal St., N. Y. City, 13. Some 2500 radio and Tv receiving tube types are systematically listed in numerical sequence with accompanying wiring instructions for making the substitutions. Views of the original tube sockets and the substitute sockets further simplify the making of substitutions.

Additionally, the guide contains valuable information on cathode-ray tube characteristics, instructions for making adaptors, ballast tube data, pilot light information, resistors-capacitors-transformer color codes, transformer substitution, fixed condenser substitution, and converting farm radio to electric operation. Anybody working with tubes under existing shortages will find this book an indispensable tool. It contains 208 pages in a heavy durable paper cover, is $8\frac{1}{2}$ x 11 inches, and is priced at \$2.40.

ONE of the basic problems that must always be faced in the design of high-intensity projectors is the possibility of overheating and buckling the film. This difficulty is particularly acute in the case of motion picture film projected by arc lamp illumination, where a great deal of energy is concentrated on a small area of film. The customary approach to this problem is to absorb the troublesome infrared radiation with a heat-absorbing glass placed between the light source and the film.

Another approach to this problem is the use of multilayer interference filters to separate the visible light from the infrared and ultraviolet radiation. Interference filters designed to transmit visible light and reflect infrared and ultraviolet have proved useful, but their effectiveness is restricted by the limited band of infrared energy which they reflect. Hence, such filters are usually less efficient than the heat-absorbing glasses. They are useful, however, as supplementary filters or in applications where high efficiency is not necessary and where breakage of heat-glass is a major problem.

Separating Heat From Light

Much more nearly complete separation of light and heat can be obtained if a multilayer filter is used in the inverse manner, that is, to reflect the light and transmit the infrared and ultraviolet radiation. The mirror in an arc lamp-house is particularly well suited for this purpose. If the mirror blank is coated with interference films instead of with silver, most of the visible light can be reflected, and most of the infrared and near-ultraviolet radiation transmitted, as shown in Fig. 1.

The interference films shown consist of 4 to 11 layers of transparent or semi-transparent materials of alternately high and low refractive index. There is a wide variety of materials, including dielectrics and semimetals, that have optical properties suitable for this purpose. Magnesium fluoride or sodium aluminum fluoride are the customary low-index materials, and zinc sulfide or titanium di-

† J. Soc. Mot. Pict. & Tv Engs., Oct., 1950, p. 439.

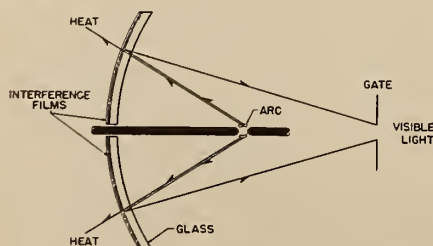


FIG. 1. Simplified diagram showing positions of arc, mirror and gate.

Interference Mirrors for Arc Projectors†

By G. J. KOCH

Eastman Kodak Company

A large fraction of the radiation from an arc lamp consists of infrared and ultraviolet energy. By coating the arc mirror blank with multilayer interference films instead of with silver, the major portion of the visible light can be reflected, while most of the infrared and near-ultraviolet radiation is transmitted. Hence, this type of mirror reduces film distortion caused by overheating, and because of the selective nature of the reflection, it affords a means for controlling the color quality of the illumination.

oxide the usual high-index materials.

The thickness of the films is controlled so that visible light is reflected from each film in phase with the light reflected from the other films; hence, the combination produces high reflection. In general, however, for wavelengths outside the visible region, the component reflections are out of phase, which results in low reflection and high transmission. Thus, the multilayer coating is a selective mirror that reflects visible light and transmits infrared and near ultraviolet radiation.

Reflectivity, Spectral Characteristics

Figure 2 includes a curve showing the approximate reflectivity versus wavelength for an interference mirror of this type. A second curve showing approximately the spectral reflection of a silvered mirror is shown for comparison. It reveals the large reduction in reflection in the infrared and near ultraviolet parts of the spectrum secured with the interference mirror.

In fact, for infrared and near ultraviolet radiation, the thin films act as low-reflection coatings, allowing those regions of the spectrum to pass through the mirror with little attenuation. But for visible light the films act as high-reflection coatings with a reflectivity equal to or greater than that of a silvered mirror.

The exact shape of the reflection-wavelength curve depends primarily on the following factors: the reflectivity at each film interface, the number of layers, the

optical thickness of each layer relative to that of the other layers, the dispersion and absorption characteristics of the materials, and the angle of incidence of the light. The calculations involved in the design of efficient combinations are so formidable that graphical and analogue computing devices have proved most helpful.

The films are deposited on the glass mirror blank in a high-vacuum coating system. The procedure consists in successively evaporating the required number of layers on the glass blank, which rotates continuously in the high-vacuum chamber. Critical control of the thickness of each layer is obtained by the use of a photoelectric monitoring system that indicates the thickness of the material as it condenses on the glass.

Successful mirrors have been made with the coatings on the front surface instead of the rear, but damaging of the multilayer films by the sputtering of the arc makes such mirrors less practicable. A high-temperature lacquer sprayed and baked on the films protects them from mechanical damage. It has been found that the lacquer actually improves the optical efficiency of the layers by increasing their transmission in the infrared region.

Still in Development Stage

Although mirrors made in this way still are in the development stage, the tests made on them have been very encouraging. Measurements on the first arc-lamp samples showed that the illumination at the gate contained more visible light and less total radiation than that obtained from a standard silvered mirror with light shade of Aklo heat-absorbing glass in the beam. Even the most efficient heat-absorbing glasses show a gradual decrease in transmission from wavelengths of 600 to 1000 millimicrons; hence they allow an appreciable amount of near infrared energy to reach the film.

But interference mirrors are not limited by this fundamental absorption characteristic. Both calculations and experiments have shown that considerably sharper cuts can be obtained with interference reflectors than with silvered re-

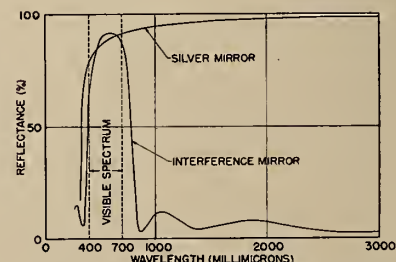


FIG. 2. The spectral reflectance of a multi-layer interference film compared with that of the conventional silver film.



He gives shape to things to come...

HIS the ability to see each script through the camera's eye . . . to picture with brush and pencil the story's dramatic highlights . . . and, finally, to shape sketches into settings of authentic merit.

He is the screen's art director, at once responsive and responsible. Not only must he be sensitive to the mood of the story . . . giving full consideration, as well, to the personality of the star . . . but

also he must be constantly aware of the practicalities of motion picture production, be able to work closely with scores of crafts within and without the studio.

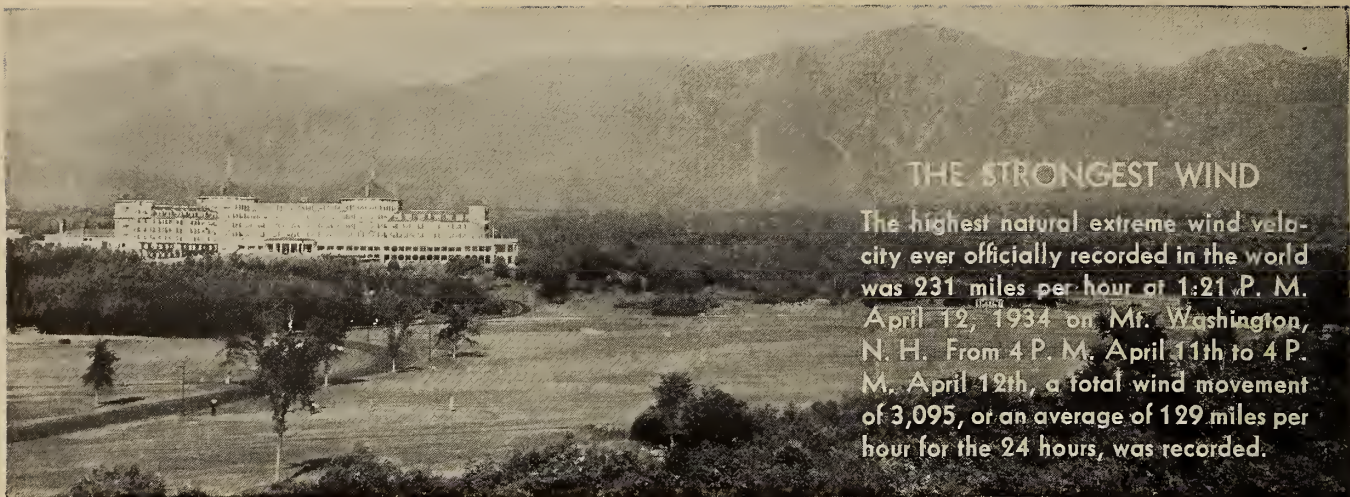
Above all, the art director knows the importance of the faithful reproduction of the values he creates . . . an assignment he is well content to see competently handled by Eastman's famous family of motion picture films.



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THE STRONGEST WIND

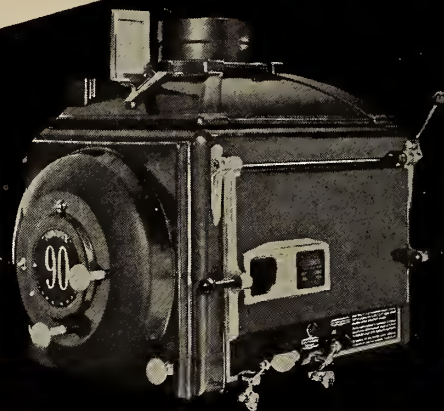
The highest natural extreme wind velocity ever officially recorded in the world was 231 miles per hour at 1:21 P. M. April 12, 1934 on Mt. Washington, N. H. From 4 P. M. April 11th to 4 P. M. April 12th, a total wind movement of 3,095, or an average of 129 miles per hour for the 24 hours, was recorded.

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Theatre men are agreed that the Strong Mighty "90" is the peer of all projection arc lamps. This 75 to 130 ampere reflector arc lamp, with exclusive Lightronic Automatic Focus Control, at 90 amperes projects 21,000 lumens.

Outstanding features include: Forced air-cooled feed mechanism. Low operating temperatures. Bi-Metal Lightronic Tube controls both carbon feed motors. Simple feed rate adjustment. Big 16½-inch reflector matches high speed f1.9 lens. Air stream arc stabilization. Unit construction permits instant removal of major components. Rugged burner mechanism. Complete combustion of black soot. White deposit on reflector prevented.

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☐ ☐ I would like a demonstration of the Strong Mighty "90" in my theatre, without cost or obligation.

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☐ Street

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flectors used with heat-absorbing glasses. In the ultraviolet region also, the decrease in reflection with wavelengths is sharp, but detailed measurements have not yet been made. Certainly the peak at 390 millicrons in the arc emission curve is greatly reduced.

Glass Breakage Eliminated

A second advantage of such mirrors is that they eliminate the problem of breakage of heat-glass. Since the interference films absorb little radiation, and since they are distributed over the large area of the mirror blank, they do not get nearly so hot as a heat-absorbing glass. Actually, the absorption of infrared by the glass mirror blank itself is largely responsible for the temperature rise observed.

Probably the most important advantage

these mirrors have over a silvered mirror used with a heat-absorbing glass is the control that can be attained over the color quality of the light. By proper adjustment of the thickness of the interference layers, the color of the reflected light can be varied over a wide range. This factor is of major importance for the projection of color film.

Our experimental arc mirrors for 16-mm projectors are coated so that light from a high-intensity arc is modified to give satisfactory color balance for the projection of Kodachrome film.

The development work on this type of mirror is still in the laboratory stage. Further details, such as life tests and more efficient combinations of layers, are being investigated. When these tests are complete, we plan to try the coatings on 14-inch mirrors for tests in 35-mm arc projectors.

plete scanning of the Tv screen to be recorded on each frame of the film.

Only 60-Second Time Lapse

The rapid processor develops, washes, and fixes the film; dries it with infrared rays, waxes it, and feeds it to the projector—all within 60 seconds. It may be operated in a fully lighted room, and requires no attention.

Audiences at the demonstrations agreed that a major advantage of the new system was the brilliance of the projected picture. The GPL projector is equipped with a powerful arc lamp that produces a picture that is clear and bright throughout the screen area of 18 x 24 feet. The image has the quality of regular Hollywood-produced films instead of the dimness and grayness heretofore experienced.

GPL Videofilm systems are now in production at the GPL plant in Pleasantville, N. Y., and installation in theaters are scheduled to begin soon. Theater Videofilm units are available through National Theater Supply Co.

GPL's 'Videofilm' System for Theater Tv

A NEW theater Tv system that operates at one-fifth the cost of other type systems and puts full-screen, high-quality Tv within the reach of the small town and neighborhood movie house was successfully demonstrated by General Precision Laboratory* before the recent conventions of TESMA, in Chicago, and the TOA, in Houston. The economy stems from the use of 16-mm instead of 35-mm film in this new compact equipment, illustrated on this page.

Performance of this new equipment with both "live" and pickup program matter demonstrated that the quality of the picture and sound obtainable with 16-mm film is comparable to the best that can be obtained with 35-mm film.

With the new GPL equipment the theater owner has complete control of programming. He may project the televised program at once from film that has been exposed, fixed, washed and dried and fed into the projector within 60 seconds of the actual event; he may hold the film for later showing, or he may project the program at once and repeat it as often as he wishes in one theater or a chain of theaters. It gives the theater operator all the entertainment values of Tv plus the timing and program advantages of film.

Details of the System

With the present total of Tv stations, it is possible for only about one-fourth of the nation to see and hear Tv programs conveniently. The GPL development puts nearly all the other 75% of the population within convenient reach of Tv reception.

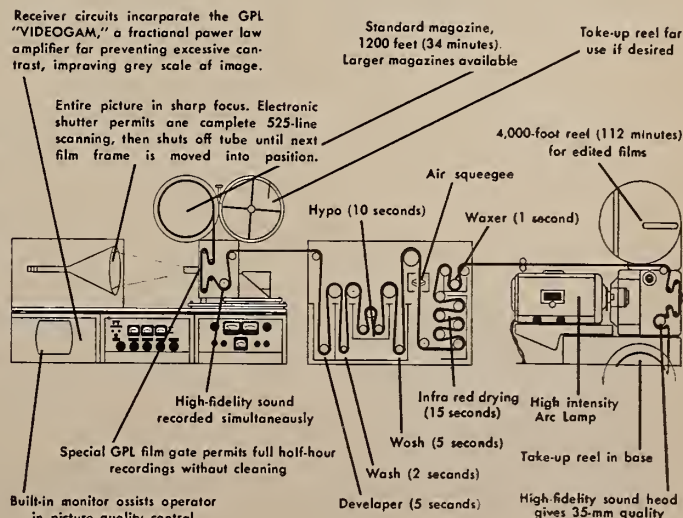
The GPL Videofilm system is made up

of three compact units: a video recorder, a rapid film processor, and a projector. The units are small enough, the system flexible enough to be installed in the average theater without interfering with the operation of existing projection equipment. The video recorder is simply a Tv receiver with a camera that photographs telecasts as they are received, recording sound simultaneously.

The receiver is far more powerful than an ordinary home Tv receiver. The image is sharper, brighter, and in focus over the entire area of the tube. Pictures are less contrasty and full values of the grays are retained.

The camera has a unique electronic shutter, accurate to one two-millionth of a second. The shutter synchronizes the 30-pictures-a-second of the Tv receiver to the 24-pictures-a-second of the motion picture camera, allowing only one com-

Reproduction process chain in new GPL theater Tv system, after image is picked up. This is the equipment that projectionists will operate in the theater.



* A subsidiary of General Precision Equipment Corp., which also includes National Theater Supply Co., The Strong Electric Corp., J. E. McAuley, International Projector Corp., and others.



They're being installed—and fast—in theatres, night clubs, coliseums, arenas and stadiums. Circuses carry them. Ice shows declare they have no equal. Schools, universities and colleges are putting them to work. They're used to spot the entrance of the "rasslers". They've been installed in TV studios. Industrial shows and conventions call for them. Even churches want them! Projectionists are buying them in great numbers and putting them out on a rental basis.

The Strang Trouper assures a knife-sharp, steady, uniformly brilliant, dazzling snow-white spot. It draws only 10 amperes from any 110-volt A.C. convenience outlet.

It's easy to operate. The automatic arc control maintains a constant arc gap, free from hiss or flicker. A trim of carbons burns one hour and twenty minutes at 21 volts and 45 amperes.

It makes the use of heavy rotating equipment unnecessary. The adjustable, self-regulating transformer is an integral part of the base. The Strong Trouper is mounted on casters. It is easily disassembled for shipping.

A horizontal masking control can be angled at 45 degrees in each direction. A color boomerang contains six slides and an ultraviolet filter holder.

The optical system utilizes a silvered glass reflector and a two-element variable focal length lens system.

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'Excelite' Lamp Automatic Arc Control

Numerous inquiries have been received anent the mention in the article on the "Excelite" arclamp in IP last month (p. 26) of a "bi-metal automatic arc control." The appended data was supplied by the manufacturer, The Strong Electric Corp.

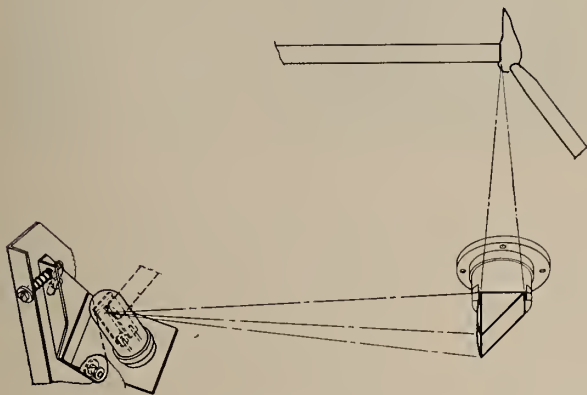


FIGURE 1

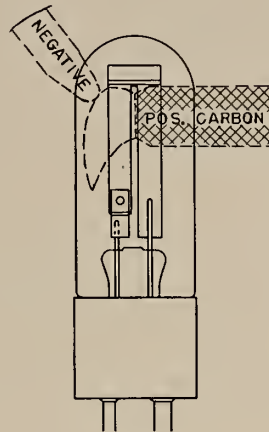


FIGURE 2

THE carbon feed system of the new Excelite lamp is one of its salient features. The positive and negative carbons are each fed by separate motors, with a simple single control setting for all feed rate requirements.

A precise automatic positioning control for the positive carbon crater location is incorporated in this new feed system. A heat image of the positive carbon and arc gap is focused by lens action on a sensitive bi-metal element, as shown in Fig. 1, which outlines the image path from the burning electrodes to the bi-metal control tube *via* a prism with a lens ground in one face.

'Brain' of the Carbon Feed

The bi-metal control tube is the "brain" of the Excelite carbon feed. Its function is to detect any departure of the burning tip of the positive carbon from its established location and to apply such necessary corrections to both the positive and negative feed motor speeds so as to maintain the tip of the positive carbon at its established location, thus insuring that the quality of the projected light will remain constant.

The bi-metal element is of the so-called doubly compensated type, which means that by virtue of its shape it will cancel out any false signal that might be imparted to it by a change in room temperature. Furthermore, it is sensitive to the position of the tip of the positive carbon as a result of a thermal balance between the two legs of the element, thereby assuring that a change in arc current will not alter its control point.

The bi-metal element with its platinum contacts is sealed in a glass envelope and mounted on a 4-prong tube base. The

sealed-in construction keeps dirt from collecting on the contacts and prevents their oxidation.

Action of the Control

Figure 2 shows the tube with the side image of the positive crater projected on

it in the thermal balance position. If the positive crater starts to retreat, indicating that the arc is drifting away from the lamphouse reflector, the bi-metal contact is made, causing the positive feed motor to speed up and the negative feed motor to slow down, thereby causing a corrective action while maintaining the same arc gap length.

Conversely, if the positive crater starts to advance beyond the thermal balance position, the bi-metal contact is opened, thereby causing the positive feed motor to slow down and the negative feed motor to speed up.

Burning Rate Compensation

The controlled range of speeds of both positive and negative motors is more than sufficient to compensate for the variations in burning rates of the positive and negative carbons throughout their rated amperage range.

Simplified operation of the lamp is the inevitable result of this control, because it is only necessary to set a single lamphouse control to the desired arc amperage and adjust the power supply to the proper voltage or "pressure" to keep the arcing carbons at a reasonable spacing.

Maintenance of the position of the positive carbon and the determination of positive and negative carbon feed speeds are then automatically handled by this new bi-metal control tube.

Projectionist Examination Questions

Based on Examinations by Leading U. S. Municipalities

1. One of the following conditions will increase the resistance of an electric circuit: (a) an increase in the diameter of the conductor; (b) a decrease in the diameter of the conductor; (c) a decrease in the length of the circuit, or (d) a change in the conductor to one of the same size but of greater conductivity.

2. After a gas becomes "ionized" it (a) liquifies; (b) evaporates; (c) becomes a conductor of electricity, or (d) becomes a non-conductor of electricity.

3. The speed of synchronous motors depends upon (a) increase or decrease of the load; (b) frequency of the supply line; (c) voltage fluctuations of the line, or (d) voltage of the D. C. excitation.

4. On testing amplifiers you find a low plate current reading. To remedy this condition you should (a) change the voltage tap on the power transformer; (b) clean the carbons; (c) clean the tubes, or (d) replace the tubes.

5. The mechanism which operates the intermittent sprocket is called the (a) scanner drum; (b) drive

motor; (c) constant speed sprocket, or (d) intermittent movement.

6. The mechanism which causes the film to remain stationary in the gate is called the (a) lower sprocket; (b) upper sprocket; (c) constant speed sprocket, or (d) intermittent sprocket.

7. The name given to the blade on the flicker shutter which covers the lens while the intermittent sprocket is in motion is (a) master; (b) primary; (c) pilot, or (d) focusing.

8. The function of the filament in a three-element vacuum tube is to (a) cut down on the amount of electricity used; (b) cause the tube to give heat; (c) register the amount of electricity, or (d) give off or cause to give off electrons.

9. The head amplifier amplifies the currents coming from the (a) main amplifier; (b) soundtrack; (c) exciter lamp, or (d) photoelectric cell.

10. Slow fluctuations in motor drive speed will create the condition called (a) "wows"; (b) flutter; (c) variability, or (d) flicker.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

THE fight for decent sanitary and ventilating facilities in projection rooms of motion picture theaters throughout the country continues. It is only by constant plugging away at the issue plus the grim determination of union officials to improve working conditions that we can hope to achieve any measure of success. While it is true that a majority of theaters in large cities—New York, Chicago, Los Angeles, *etc.* — have properly equipped projection rooms (even though the exhibitors made the improvements with the utmost reluctance) there are thousands of theaters throughout the country wherein the projection room is little more than a hole in the wall—a definite fire and health hazard.

V. V. Vaught, president of Local 328, Pine Bluff, Ark., has joined the ranks of the many IA officials who for years have been waging a relentless war against those theater owners who stubbornly refuse to spend a dime to better the working conditions of their projectionists, the while they spend thousands of dollars for beautiful lobbies and other front-of-the-house equipment.

An exchange of ideas between the various Local Unions who have at one time or another fought for such measures would prove beneficial to all concerned. While each state has its own particular problems, the general procedure is pretty much the same. Much time and money can be saved by profiting from the other fellow's mistakes.

- An important amendment to the Social Security Law affecting working men and women of 75 and over became effective September, 1950. This amendment allows persons 75 years of age and over to retain their jobs and still be eligible to receive their S. S. allotments, regardless of how much they earn on their jobs. We have not a few members in the Alliance who have reached that age, and it would be well to acquaint them with the foregoing so that they may receive the benefits due them under this new ruling.

- The recent TESMA conference in Chicago had the largest projectionist attendance of any similar gathering. More than

400 projectionists, many from out of town, came to inspect the various projection and Tv exhibits. Clyde Cooley, secretary of Local 343, Omaha, Nebr., left Chicago at the close of the TESMA sessions to attend the SMPTE convention which was held the following week at Lake Placid, N. Y. Joe Cifre and Ed Comi, veteran theater supply vendors and members of Boston Local 182, were very much interested in the various exhibitions. Comi is the chap who made one of the first rear projection shutters.

George Walter, member of Local 686, Balboa, C. Z., was in charge of the Lorraine Carbon booth. We understand that Walter now represents this carbon product, and we wish him good luck in his new job.

Combining business with pleasure, Phil Sugarman, member of Providence Local 223, who was in Chicago visiting his new grandson during the TESMA week, spent considerable time inspecting the various exhibits. Leonard Caffisch, member of Chicago Local 110, very capably operated the Tv projector shown by General Precision Labs. (Simplex affiliate), and was commended for the fine job he did in explaining the intricacies of the mechanism to the visitors.

The National Carbon Co. cocktail party, preceding the TESMA banquet, was

a lulu. Despite the unexpectedly large attendance, the NCC boys extended themselves and took care of every last visitor in handsome fashion. Representing NCC were William Christian Kunzmann, Vincent Jacob Nolan, David Benjamin Joy, Chester Elwood Heppberger, Paul Reis, Charles William Handley, Orville Byron Rendahl, Erwin Rudolf Geib, Wallace Willie Lozier, Harry Stewart, Carlos O. Kleinsmith, and Raymond Patrick Bergan. All these, and Canadian representatives C. H. Vatcher and W. H. R. Jeckell, too.

- Hollywood Local 165 held a special election recently to fill two vacancies caused by resignations. Daniel Haworth is the newly-elected vice-president, and William Beecher was elected a member of the board of trustees.

- For his splendid work in improving labor-management relations, Frank H. Callahan, member of Local 195, Manchester, N. H., for the past 40 years, was presented with the Toland award at the recent 49th annual convention of the New Hampshire Federation of Labor. Callahan is president of the Manchester Central Labor Council and has devoted the greater part of his life to unionism.

- The IA lost another veteran member

CALIFORNIA'S GOVERNOR WARREN AND LOCAL 162 OFFICIALS AT LABOR RALLY



Labor's choice Governor-elect Earl Warren pictured with IA Local 162 officials at a pre-election rally at Sailors' Union, Pacific Building, San Francisco. With the Governor (second from left) are Thomas J. Kearney, secretary-treasurer; Floyd M. Billingsley, 3rd IA vice-president and L. 162 business representative; and John A. Forde, L. 162 president.



The late Lewis Townsend, who was one of America's outstanding projection technicians.

corn roast party. "The Monday Midnighers" is a social group comprised of members of Local 171, and had its origin back in 1932 when a number of members formed the habit of meeting on Monday nights after the theaters closed, hence the name. It is now chartered under the laws of Allegheny County, Penna., and has 100 charter members. Plans are under way for the expansion of the group's activities to include not only social but education and welfare matters. Officers of the club are Bill Thompson, president; Paul Mach, vice-president; Donald Ross, secretary, and Luther Thompson, treasurer.

in the recent death of Lewis M. Townsend, member of Rochester Local 253 for the past 38 years. Lew was a former president of the Local and served several terms as a member of the executive board. He operated his own projector shop in addition to working in the projection room of the Regent Theater. Although in failing health for the past few years, Lew continued activities right to the wire. He was a member of the 25-30 Club.

• The 39th (?) birthday of Bill Thompson, business representative for Pittsburgh Local 171, was recently celebrated at the "Monday Midnighers" annual

• Good luck to the newly-wed Oscar E. Olsens, of Milwaukee, Wis. Oscar, business representative for Local 164, married Miss Dorothea Ricker last month in the Crystal Room of Pheister Hall. Needless to say, the couple were given a grand sendoff by their many friends and well-wishers.

• Charles W. Handley, West Coast technical specialist for National Carbon Co., left with Mrs. Handley for Trinidad, B. W. I., where they visited with their daughter and two grandchildren. Their

PITTSBURGH LOCAL 171 SOCIAL GROUP HONORS BILL THOMPSON ON HIS BIRTHDAY



Top: Bill Thompson, president of the "Monday Midnighers," surrounded by an admiring group of ladies, views the birthday cake presented to him on what he admits is his 39th birthday. Pictured below is a group of merrymakers at the birthday party, which was held in conjunction with the club's annual corn roast.

ALABAMA LOCAL WINS SECOND PRIZE



W. I. Caraway, member of Local 806, Tuscaloosa, Ala., stands beside the projector used in the float that won second prize for the Local in the last Labor Day parade. This imitation projector was built by young Caraway and his father, J. I., president of the Local.

son-in-law, Lt. F. H. Sonntag, US Navy, is stationed at Trinidad.

• TMA (Theatrical Mutual Association) Lodge No. 37, Pittsburgh, Penna., held its first dinner-dance last month at the May Club. The party was such a success that the event likely will become an annual affair.

A bronze plaque, which carries with it a life membership in TMA Lodge No. 67, Long Island, N. Y., was presented recently to Past-President Charles F. Eichhorn, in recognition of loyal services rendered during his 25 years membership in the Association. Eichhorn served two consecutive terms as president of Lodge No. 67 and as president of the Grand Lodge. Presently a member of the Laws, Appeals & Grievance Committee of the Grand Lodge, he has been a member of New York Local 306 for many years.

• James A. Whitebone, secretary and business representative for Local 440, St. John, N. B., was again elected to the city council. Whitebone has had many honors conferred upon him in past years, and deservedly so, for there are very few men who give of themselves to the cause of unionism as unstintingly as does Jim. He was recently reelected vice-president of the Trades and Labor Congress of Canada, and is also president of the New Brunswick Federation of Labor.

• The N. Y. State Association of Motion Picture Projectionists held its 22nd annual meeting on October 31 last at the Hotel Arlington, Binghamton, N. Y., in conjunction with the 35th anniversary celebration of Binghamton Local 396. Part of the business session was given over to a demonstration of the Simplex XL projector mechanism by Arthur E. Meyer, vice-president of International Projector Corp., who was assisted by Henry F. Heidegger, one of IPC's ablest

technicians. Both Henry and Arthur went to great lengths in explaining the operation of the equipment, their efforts being greatly appreciated by the delegates.

- Our good friend, Pete Mole, president of Mole-Richardson Co., Hollywood, Calif., well-known manufacturers of studio lighting equipment, was elected president of the SMPTE at the Society's recent convention. Pete is a product of New York's East Side, and although he has made the West Coast his home for many years, he delights in getting together with other alumni of the East Side (like yours truly, for instance) and rehash the glories (?) of his boyhood days.

- Los Angeles Local 150 awarded gold plaques to R. H. McCullough, W. Bantau, John Tattaglia, Harry Johnson, and Carl Moeler in appreciation of their valuable advice and assistance in the planning and building of the Local's new headquarters. In presenting the awards, Earl Hamilton, president, expressed the Local's deep gratitude to these men who gave so generously of their talents and time to this selfless activity.

25 Years Ago—November 1925

- The charter of Local 417, Arkansas City, Kans., was suspended for non-payment of per capita tax. . . . The IA Executive Board met at the Hotel New Belmont, Atlantic City, N. J. . . . William J. Harrer, member of Philadelphia Local 8, unanimously elected IA seventh vice-president, succeeding H. Guy Culver, who resigned because of ill health. . . . Appeal for reinstatement from Albert Runnell, former member of Local 59, Jersey City, N. J., denied. . . . Warnings issued to be on guard against Irving Nezin, who falsified his application for membership in Local 287, Beaver Falls, Penna. . . . Marvin J. Engstum, G. E. Rasmussen and Hy Crooks expelled by Local 475, Eau Claire, Wis., for working in theaters on unfair list.

N. Y. STATE ASSOCIATION OF MOTION PICTURE PROJECTIONISTS

Earle Tuttle (Binghamton L. 396), *pres.*; George Raaflaub (Syracuse L. 376), Harry H. Lackey (Utica L. 337), John F. Short (Corning L. 480), *vice-pres.*; Charles F. Wheeler (Geneva L. 108), *sec.-treas.*; Louis Goler (Rochester L. 253), *sgt.-at-arms*; Fred Boekhout (Rochester L. 253), William Connolly (Johnstown L. 535), Walter Scarfe (Syracuse L. 376), James J. Gallery (Auburn L. 119), Francis Foran (Bradford L. 335), *educ. comm.*; Kenneth Allfrey (Gloversville L. 290), Ralph Halleran (Elmira L. 289), Gerald Henderson (Batavia L. 581), George Nugent (Troy L. 285), William Nangengast (Nassau L. 640), *exec. board*.

Cites 'Three Lacks' in Most Voluntary Health Plans

TOPMOST in the minds of union officials in work-wage negotiations these days is the inclusion in the contract of a welfare provision in the form of either a pension or an employer-sponsored health-hospitalization plan, or both. In no union is there a stronger feeling about the necessity for such provisions than in the IA, which has been seeking for years, and now appears to be on the brink of accomplishing, just such a set-up.

Extremely interesting in this connection was a recent address by Dr. Louis Bauer, chairman of the board of trustees of the American Medical Association, who discussed health insurance plans. Excerpts from his address are appended hereto:

"Voluntary plans as opposed to compulsory health insurance . . . are said to be the most rapidly expanding insurance program in the history of the United States, which is a pretty insurance-minded country. We (the A.M.A.) still feel that there are three lacks in the voluntary insurance plan.

"One of these is that we must have individual enrollment instead of group enrollment.

Age Factor; Long Illness

"Two, we must have protection for people who are over 65 years of age. Both of these are now rapidly coming into effect. Nearly all plans will take people on an individual enrollment now, and the same on the 65-year-old business. If a man is once in, he can stay in as long as he lives.

"The third is that we want a policy against financially catastrophic illness, that is, the person who is ill for a long period of time

with a chronic illness. That we are working on now. The California Physicians' Service is the first one to come out with such a policy, and that came out several months ago, in which a person can be protected against a long-duration illness which to him is catastrophic financially.

Hopes Other Companies Follow

"We hope that within the next year or two all other companies, both commercial and nonprofit, will follow suit. When we have that, I think we will have the voluntary program in pretty good shape."

Nearly 70,000,000 people Dr. Bauer said, are now enrolled in the Blue Cross hospitalization insurance plans, "and we feel that there will probably be 90,000,000 enrolled." He added that the various nonprofit voluntary medical care insurance plans backed by the medical societies "have now reached a total of 17,000,000, and they, together with the various other types of plans, through industry and labor and commercial plans, cover about 50,000,000 people."

New TESMA Headquarters on Coast

Effective Nov. 1, the new address of the national headquarters of the Theater Equipment & Supply Manufacturers Assoc. (TESMA) is 4626 Melbourne Ave., Hollywood 27, Calif. This is two blocks north of Hollywood Blvd. and one-half block east of Vermont Ave. The 'phone number will remain the same: Normandy 7747. Roy Boomer in charge, of course.

Sharp Decline in Amusement Taxes

Amusement taxes for September last, reflecting August, were \$31,346,385, almost \$4 million less than the same period in 1949. The first nine months of this year show a decline in amusement taxes of more than \$12 million over the same period last year.

Projection Lens Miscellany

THE KOLLMORGEN OPTICAL COMPANY

DOES A FAST LENS ELIMINATE THE SO-CALLED 'HOT SPOT'?

Yes, to a very large extent. The faster the lens and the higher its quality, the more uniform will be the screen illumination.

IS THIS 'HOT SPOT' WORSE WITH SHORT FOCAL LENGTH LENSES?

Usually. The falling-off in screen illumination at the corners can be quite severe with poor lenses. When this problem is given full consideration in the lens design, remarkably even screen illumination is achieved.

IF THE SPEED OF AN ARCLAMP BE SLOWER THAN THE LENS, WHY USE A FAST LENS?

This topic has been discussed in detail in various issues of IP. In brief, a fast lens gives more illumination because,

having larger lens elements, it picks up more of the edge illumination than does a slower lens with correspondingly smaller lens elements.

WHAT IS THE TOLERANCE IN FOCAL LENGTH FOR A GOOD MODERN LENS?

A good modern lens should be within the 1% plus-or-minus tolerance area recommended by the Society of Motion Picture & Television Engineers.

IN ACTUAL PRACTICE, WHAT DOES THIS PLUS-OR-MINUS 1% MEAN?

It means that the actual picture size for any focal length lens will be within 1% plus-or-minus of the computed picture size. Thus, if a 20-foot wide picture (240 inches) is desired, the actual projected picture might be 238 or 242 inches and still fall within the accepted tolerance.

Brush-up on Fundamentals

RADIO, sound equipment, and television have one thing in common—they all depend upon electricity for their operation and motivation. To achieve proficiency in these subjects, a knowledge of the fundamentals is essential. First, what is electricity? This question seems to be a very simple one to answer, and yet a complete answer never has been given. A famous scientist stated recently that 96% of our knowledge as to the true nature of electricity has not been expounded to date.

The phenomenon that is electricity has been known to civilized peoples for many centuries. The ancient Greeks discovered that when an amber rod was vigorously rubbed on a piece of cloth it acquired the property of attracting to it small pieces of paper, cloth, dust, and other non-metallic substances. It is from the Greek word "electron", meaning amber, that the word "electricity" was derived.

Although our knowledge of electricity is limited to some extent, we have been able to find out a great deal about its nature, its effects, and its applications. We know, for example, that all forms of matter contain some electrical charges. But what is matter? Everything that goes into the makeup of our universe may be classified as matter. The air that we breathe, the water that we drink, the ground that we walk upon—all are considered to be what we call matter.

Fundamental Forms of Matter

Matter exists in three fundamental forms, or "states", as they are called by scientists: (1) the solid state, (2) the liquid state and (3) the gaseous state. The application of varying degrees of heat to matter will result in a change of state taking place.

Let us first consider a piece of ice (matter in the solid state). When the ice is in physical contact with any body that is warmer than 32 degrees F., it will slowly begin to melt until it turns into water. A change of state has taken place and the solid piece of ice has now turned into a liquid. Any further application of heat will have little effect upon the state of the liquid, until enough heat is added to cause the water to become vaporized. When the water has begun to vaporize, it will turn into steam, and we know that steam is a gas.

The reason why these changes take place in various kinds of matter is because changes take place in the tiniest particles from which matter is composed. The number and arrangement of these

With theater television, three-dimensional movies in color, and stereophonic sound looming on the technological horizon, it is absolutely essential that we make certain of our knowledge of fundamentals before we explore the new and novel. The appended article is directed to this end, as will be future similar review presentations.

extremely small particles is responsible for the existence of many different kinds of matter, all reacting in their own way to the influence of electricity.

Atoms, Molecules and Electrons

All matter is made up of about 97 fundamental constituents called elements.* Matter made up of only one element is said to exist in the free state. Examples of free elements are iron, copper, carbon, tungsten, aluminum, radium, gold, and silver. These free elements may be broken down into very minute particles, so small that billions of them could be placed on the head of a pin.

Some types of matter are combinations of free elements called compounds. Examples of compounds are air, water, brass, steel, and bakelite. Air and water are made from two free elements, hydrogen and oxygen, while brass is composed of copper and zinc. The smallest particle of a compound which still retains all of the original characteristics of the compound is called a molecule.

The most modern theory of the nature of electricity is based upon the structure of the atom. An atom consists of a heavy central part, called the nucleus, around which very tiny particles of electricity, called electrons, revolve. Fig. 1

* Add to this the various isotopes and other man-made variants, and the number would approach 1000.—ED.

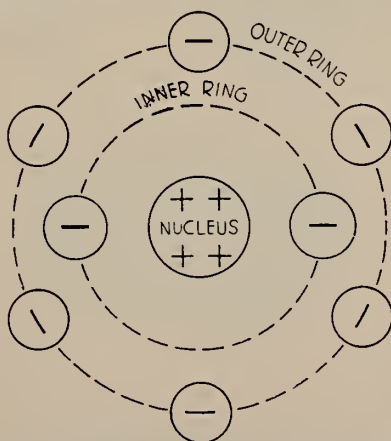


FIG. 1. Diagram of an atom, showing how electrons revolve around a positive nucleus. Only 2 rings are shown here. Electrons on inner ring are held tightly to the atom; those on outer ring are held loosely and can be easily removed.

is a simplified picture of an atom. Most of the weight of the atom is contained in the central portion (nucleus).

The atom may be compared to the solar system. We all know that the earth and all the other planets of the universe revolve in elliptical orbits (paths) around the sun. Some of the planets move in paths which are close to the sun, while others move in orbits very distant from the sun. The nucleus may be considered as the sun, and the tiny charges of electricity as the planets.

Those charges which follow paths near the nucleus are tightly bound to the atom and can only be removed by the application of tremendous pressure, while the charges which are farther removed from the center of the atom can be made to leave the atom by the application of relatively small pressures. Commercial electricity is possible only because some electrons can be forced to leave their atoms.

Positive and Negative Electricity

Having discussed the construction of the atom, let us investigate its electrical characteristics. The nucleus was found to contain an electrical charge which was unlike the electron. Scientists called this charge positive, and designated it with a plus sign (+), while the electrons were called negative charges and were designated by a minus sign (—). Also, the positive charges are sometimes called protons. An electron is, by definition, the smallest possible charge of negative electricity.

Electricity exists in two forms, static and dynamic. Static electricity is electricity at rest, while dynamic electricity is electricity in motion. Electric power of the type used in our homes, regardless of whether we use A.C. or D.C., is electricity in motion and, therefore, dynamic electricity.

When a person walks on a heavy rug he usually will generate static electricity due to friction between his shoes and the rug. If he should pick up a telephone or other metallic object he would experience an electric shock because the charges generated at the rug would discharge through his body. This type of electricity is at rest because, once dis-

charged, it disappears, unless more friction is applied to the rug.

Charged and Neutral Bodies

Static electricity is easily created by friction. The voltages generated by friction can be very large and will sometimes cause a large spark to jump between two points, thereby creating a fire hazard. For this reason all motion picture projection equipment is grounded. The charges will then leak off to ground before a spark can be created near the highly inflammable film. Gasoline delivery trucks have many heavy chains

dangling on the ground for the same reason.

All types of matter would like to remain in a neutral or uncharged state. We know that if we should touch a piece of wood, paper, or steel, we would not experience an electrical shock provided that these substances were not acted upon by friction or electricity. We consider these substances to be electrically neutral, and their average charge is zero. They still have atoms and their atoms contain positive and negative charges; but because these atoms are in a state of equilibrium, the positive charges are

equal in strength to the negative charges. The positive charges will cancel out the negative charges, and the net charge of the substance will be zero.

Suppose that we could remove one or more electrons from a neutral atom. The

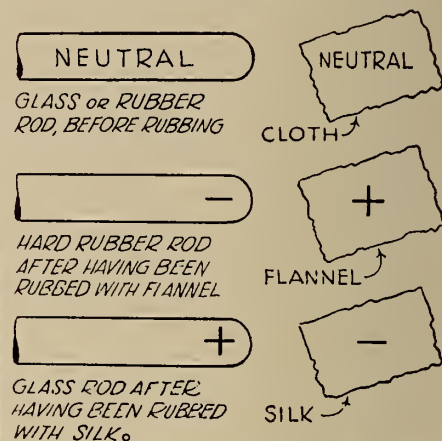


FIG. 2. Before rubbing, both rod and cloth are neutral. When the rubber rod is rubbed against the flannel, it gains electrons and becomes negatively charged, while the flannel loses electrons and becomes positively charged.

atom then would have a deficiency of electrons and it would be left with a positive charge. On the other hand, if we could take one or more electrons from one atom and give it to another, the atom which received the electrons would then be negatively charged because it had an excess of electrons. Notice that we do not speak of positive charges as moving from atom to atom; only electrons are free to move.

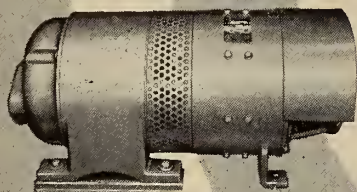
Electrons may be transferred from one atom to another by the application of heat, light, chemical action, friction, electrical pressure, and mechanical vibration. Run a comb through your hair, then hold the comb near a tiny piece of paper. The paper will be attracted to the comb. This attraction is due to the fact that *opposite* charges appear on the two objects.

End Product of Friction

What really takes place? When you run the comb through your hair, the friction between comb and hair results in a loss of electrons by the comb. The hair is then left with a positive charge and the comb with an excess of elec-



FIG. 3. A and B originally were neutral. When a positively-charged body was brought near A, it induced a negative charge on A. Part B shows that the opposite also is true.



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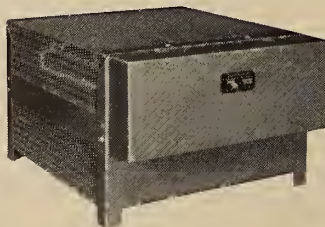
This latest Hertner development provides an unexcelled power supply for the new type National Excelite 55,000 lamps for drive-in and large theatres at extremely low operating cost.

The "HS" Transverter, equipped with a 20 H.P. motor operating at safe, slow speed of 1750 R.P.M., incorporates all of the outstanding characteristics of other Hertner Transverter models, as well as a new power conversion application for the new type lamps and carbons. The 75-volt generator is extremely economical for operating carbons at 50 to 63 volts. This Transverter also incorporates sufficient amperage output rating for 115 amperes with on ample capacity for 230 ampere changeover—a rating somewhat higher than the original 90 ampere rating for 8 and 9 mm. carbons. This additional capacity gives the "HS" Transverter a greater range of flexibility.

The entire power supply equipment for the new lamp consists of the "HS" Transverter, control panel type "G" and the new "HSD" ballast rheostat. Write for Bulletin No. 301-A.

... with Dual Projection Arc Rheostat

The 5 to 51 volt range of this new "HSD" dual-ballast rheostat with 65 to 100 ampere rating is designed to cover the entire range through 9 and 10 positive carbons for the new lamp, as well as making the "HSD" rheostat adaptable for various other Transverter and carbon applications.



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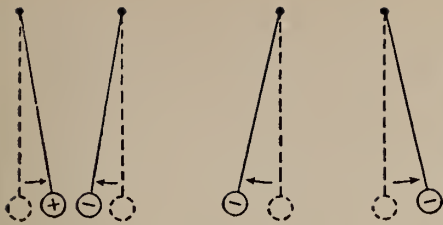


FIG. 4. The dotted lines represent the original position of two pith balls. When these balls are charged with *like* charges they will repel each other. If their charges are of *opposite* polarity, they will attract each other.

trons, or negatively charged. Why did not the opposite take place? When some objects are rubbed against others they will always assume either a positive or a negative charge. For example, a hard rubber comb will always become negatively charged when rubbed against hair or flannel.

On the other hand, if a glass rod is rubbed against a piece of silk, the act of rubbing will tear away a number of electrons from the atoms that make up the rod, leaving the rod with a positive charge. What happened to the electrons? The silk gained these electrons and is, therefore, negatively charged. The two conditions just mentioned are illustrated in Fig. 2.

We mentioned that if a charged comb were held near a piece of paper, the paper would be attracted to the comb. This leads to a basic law of electronics: a negatively-charged body will induce a positive charge in a neutral body near it; conversely, a positively-charged body will induce a negative charge in a neutral body near it.

When the negatively-charged comb was brought near a piece of neutral paper, a positive charge was induced on the paper. The paper was then attracted to the comb. Since the comb was negative and the paper positive, and since attraction took place between them, we may safely assume that a positive charge will attract a negative charge. The opposite also must be true. In general, we can say that *unlike charges will attract each other*.

What effect would one negative charge have upon another? You probably guessed the answer—they would repel. A

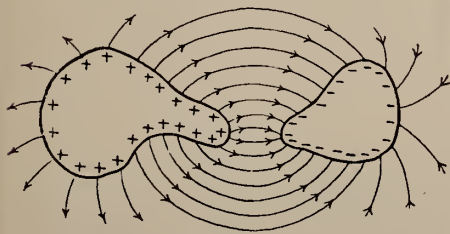


FIG. 5. The diagram illustrates the distribution of electrostatic lines or charges on an irregularly shaped body.



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positive charge would also repel another positive charge, leading to the next important rule: *like charges will repel each other*. Our entire concept of electricity depends upon these two laws. Fig. 4 will further clarify their meaning.

Electrostatic Lines of Force

Figure 5 shows how charges are distributed on an irregularly-shaped body. These charges create electrostatic lines of force which are assumed to originate on a positive charge and terminate on a negative charge. When these charged bodies are close to each other, a spark will jump from one body to the other and the charges will be neutralized, leaving both bodies without any change—that is, neutral.

Figure 6 illustrates the distribution of electrostatic lines of force first between two parallel plates, and then between a plate and a sharply pointed body. Notice the heavy concentration of lines of force on a pointed body—all charges concentrate at a point. Because of this fact sharp points are avoided on all high-voltage apparatus, since a heavy concentration of charges will result in a breakdown of insulation. This is especially true on transformers where extra insulation is used at all sharp points.

Lightning rods are purposely pointed

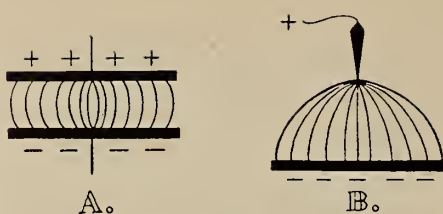


FIG. 6. A illustrating the distribution of charges on a parallel plate condenser, and B shows the heavy concentration of charges at a sharp point.

for this same reason. It is desirable to have this concentration in a lightning rod. In practice, the rod is mounted on a roof for protection from electrical storms. When lightning strikes near a building, it is attracted to the pointed rod. It strikes the rod, but the rod is grounded to a water pipe, and the charges are safely conducted to ground where they are rendered harmless.

Electron and Current Flow

So far we have been concerned only with *static* electricity. Let us now consider *dynamic*, or moving, electricity. Whenever different charges are present between two points, an electrical pressure will also appear between these two points. We call this pressure by many different names, such as potential dif-

ferences, electrical pressure, voltage, and electromotive force. The most common name is voltage. This voltage causes a drift of electrons from negative to positive, and we say that *electrons flow from minus to plus*.

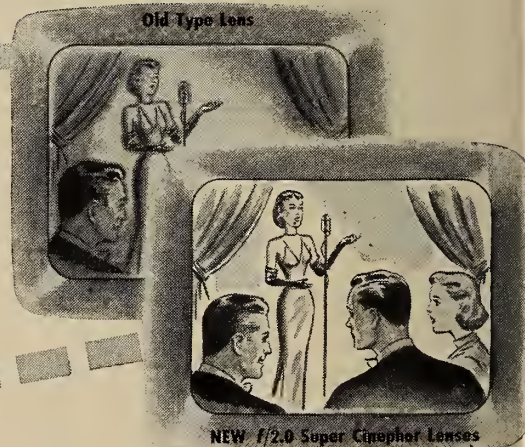
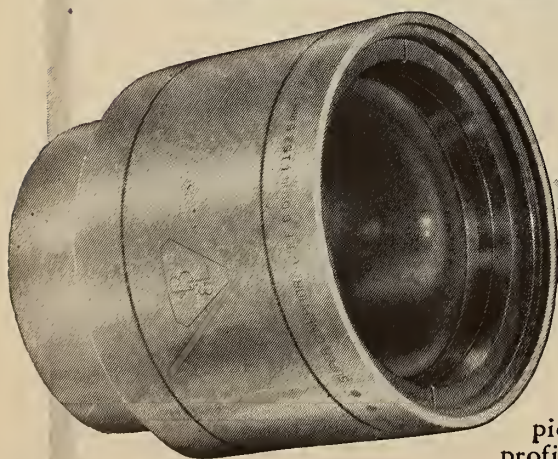
A flow of electrons constitutes an electric current. Perhaps you have been told that current flows from plus to minus. This was believed to be the case until recently. Electrical books still teach that current flows from plus to minus, but the latest works on radio and television teach the modern electron theory. Fig. 7 illustrates both theories.

Conductors, Resistors, Insulators

We have learned that all types of matter contain atoms and electrons. The amount and spacing of these electrons and atoms determine physical and electrical characteristics of matter. For instance, wood and iron look and behave the way they do because of the *number* and *arrangement* of their electrons and atoms.

In some materials the electrons are very loosely held to the atom. When a voltage is impressed across such material, the electrical pressure causes a large number of electrons to flow in the electrical circuit. These, called "free electrons", are the ones which originally were furthest removed from their atoms,

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that is, the outer electrons shown in Fig. 1.

Materials having a large number of these free electrons are called good conductors of electricity. Most metals are good conductors, as also are acid or salt solutions. Materials having practically none of these free electrons are called insulators. Some insulators used in radio are wood, hard rubber, bakelite, glass, ceramics, plastics, silk, cotton, and many other non-metallic materials.

Insulators sometimes become conductors when subjected to extreme heat, or

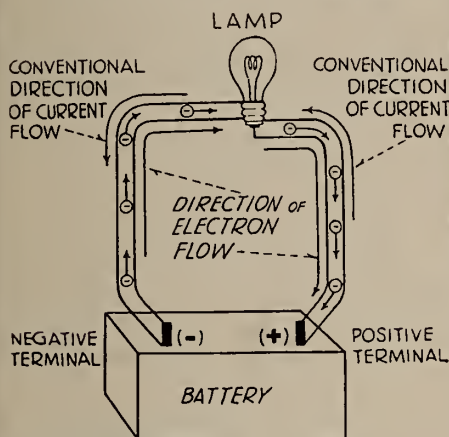


FIG. 7. Showing that electrons flow from minus to plus.

to high-frequency currents. Some materials are neither good insulators nor good conductors. These materials, called resistors, have many uses in radio circuits.

ADDENDUM: The appended questions will provide a quick check anent the degree to which you have absorbed the data included in the foregoing article:

1. Will a positive charge repel a negative charge?
2. Will a negative charge attract another negative charge?
3. Will a positive charge attract another positive charge?
4. In what direction do electrons flow?
5. Do conductors have more free electrons than do insulators?
6. Do insulators have more free electrons than do resistors?
7. Do resistors have more free electrons than do conductors?

Second Southern Coaxial Cable Link

A second coaxial cable has been opened between Indianapolis and Louisville. AT&T circuit opened on Oct. 21 and makes full-time network service available to two Tv stations in the latter city. A total of 73 stations in 42 cities are now served and extend west to Omaha and south to Jacksonville.

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Major repairs and complete overhaul of projectors, intermittent assemblies and motor-generators are included, too. For such repairs outside the theatre, RCA pays labor and transportation as well as material costs. And you can even get a "loaner" unit at no charge while yours is being repaired.

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IA-IP Radio 'Ham' Contest Deferred

Rather disappointing news for IA radio "hams" comes from Amos Kanaga, Secretary of Local 409 and guiding light behind the QSO contest which was scheduled for the week of Sept. 11-15. Amos explains that, while quite a few log sheets were received from IA men who contacted one another during the designated period, he had been deluged with complaints from the field that insufficient time was allowed for the boys throughout

this country and in Canada to get squared away for the contest.

In short, says Amos, the majority of the "hams" ask that the competition be declared "no contest" and that another date be set which will allow every amateur to take advantage of the greatly expanded "ham" list which was published in IP for October, p. 34.

Amos has acceded to this request and has designated the second week in Janu-

ary, 1951—from the 8th through the 13th—as the period during which the contest will be held. The same rules as announced previously will hold good for this next contest: the contestant must be an IA man, the exchange of QSL cards is not necessary, log sheets sent to Amos must be postmarked not later than January 17, and the Local numbers of those making contact must be indicated. Address Amos at 262 Westland Ave., San Mateo, Calif.

Handsome certificates will be awarded to those who finish in the top-ten bracket. The official IA-IP "ham" listing will be published in IP for December, thus getting everybody off on a even footing and allowing ample time for plotting one's course during the contest period.

A. E. Meyer to V-P of I. P. C.

Arthur E. Meyer has been named vice-president in charge of sales for International Projector Corp., Bloomfield, N. J., manufacturer of Simplex motion picture and sound equipment. Meyer has been associated with the motion



Arthur E. Meyer is named vice-president of International Projector Corporation. He has supervised the sales of Simplex products for many years.

picture equipment industry for the past 29 years, having started with Nicholas Power Co. as export representative in 1921, and later serving as assistant sales manager and export manager for this company.

In 1927, when Nicholas Power Co. merged with Precision Machine Co. to form International Projector Corp., Meyer was appointed export manager, in which capacity he toured the world in connection with Simplex sales. In 1938 Meyer was named sales manager for I.P.C., which post he has held until his present appointment. Extremely popular in projection circles, Meyer is a gold-card honorary member of the 25-30 Club of New York, veteran projectionist group.

Theater Tv Wire Charges Reduced

Federal tax for theater Tv use of telephone facilities will be 8% instead of the 25% charged to date. The ruling reduces a very substantial cost charge in theater Tv operations. The Bell system had previously been applying a 25 per cent tax on the use of local loops and coaxial and microwave facilities for theater Tv.

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Theater Tv: Where Do We Go From Here?

BIG news in Tv circles during the past month, of course, was FCC approval of the mechanical, incompatible CBS color Tv system, with permission granted to begin broadcasting on Nov. 20. This well-publicized occurrence, with its concomitant lawsuit filed by RCA and others, needs no extended comment herein except on the count that motion picture exhibitors fervently hope that this warfare within Tv ranks, plus the restricting orders of the National Production Board on the use of vital Tv materials, particularly for the erection of new transmitters, will constitute a "breather" for the film industry to marshal its forces in the fight to stem the flow of patronage to home Tv pastures.

But the really big news broke within the film industry itself. First, there was the positive indication given at the Theatre Owners of America convention at Houston that exhibitors have at last snapped out of their comatose state and now seem set upon taking positive steps to combat the inroads of Tv by utilizing that very art to bolster sagging box-office receipts. Second, there was the introduction by General Precision Labs. of a theater Tv system which will supplement RCA's equipment, nine theater installations of which already have been made.

TOA's Theater Tv Stand

The TOA gave enthusiastic support to a plan for a nation-wide theater Tv network, with plans being made to push vigorously the theaters' demand that the FCC grant suitable frequency allocations.

TOA members came up with the following conclusions: (1) theater Tv increases box-office receipts, as attested to by every situation where it has been employed thus far; (2) Phonevision (pay as you view) is the "flying saucer" of Tv: nearly everyone has heard of it, no one has seen it, and "it will eventually disappear"; (3) Tv film entertainment is definitely moving toward the short subject, with longer shows no longer being profitable to broadcasters, nor can sponsors afford them, and (4) major Hollywood product cannot be supported by Tv.

It is estimated that, barring unusually severe NPB materials restrictions, Americans will buy an average of 8 million Tv sets a year for the next several years, and within four or five years about 40 million sets will be in use with nationwide saturation coverage provided by from 700 to 1000 Tv stations.

The Hydra-Headed Problem

The theater Tv picture is muddled by a situation akin to a dog chasing his tail. Tv systems figure to cost somewhere between \$25,000 and \$40,000. Who will pioneer in this stiff expenditure? But until the ball is started rolling, the price per installation will remain high, as is pointedly stated by system manufacturers.

But once a theater installs Tv equipment, what will it use for program material? Will the occasional Tv program justify such a capital outlay? Will theaters be permitted to pick up programs

broadcast by the Tv networks? (Here enters again that old debbil of a question as to who owns the air, or who owns the rights to a given program once it is flung into the ether.)

The matter resolves itself into a proposition where there must be concerted action by a large number of theaters spotted throughout the country before the ice can be broken in terms of obtaining fre-

quency allocations from the FCC, in arranging suitable program material, or in effecting a sharp reduction in the cost of theater Tv equipment.

In short, the situation calls for the expenditure of a large chunk of cash by a venturesome group of exhibitors who, after their money is spent, have no assurance whatsoever that the deal will pan out. Still, without this initial impetus by such a group, theater Tv promises to remain in its present langorous state.

Thus the questions that the motion pic-

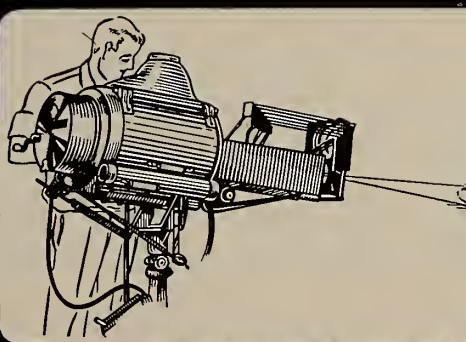
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ture exhibition field will have to answer—and quickly—if effective opposition to home Tv is to be forthcoming. And it had better be in one hell of a hurry.

TESMA Stages Biggest Show

The recent TESMA Trade Show, held in conjunction with the annual TEDA meeting, at the Stevens Hotel, Chicago, chalked up a new attendance record of 2100 registrants. Equipment for the drive-in theater dominated the show, but apart from the initial public demonstration of the new General Precision Laboratory theater Tv system (described elsewhere herein) there was no new projection equipment displayed which has not been described in IP.

There was no election of officers this year, the holdover executives being Oscar Neu (Neumade Products) as president, Bob Hoff (Ballantyne) as vice-president, and Roy Boomer as secretary-treasurer.

Exhibitor Participation Sought

There developed a feeling among the equipment exhibitors that a show of this character deserved a very much greater audience of theater owners than it has yet been able to attract. In this connection the TESMA directors appointed a committee to confer with both the large national exhibitor groups, TOA and Allied, in an effort to arrange a joint meeting between the equipment people and the theatermen.

Many manufacturers expressed the

fear that the first moves of the National Production Board indicated a "tough" policy with respect to allocation of materials, and that the maker of motion picture equipment who expected preferential treatment in this respect was deluding himself.

No plans for next year's show were formulated pending a report from the committee on a joint manufacturer-exhibitor meeting.

SMPTE 68th Convention Notes;

Next in N. Y. City April 30

Some 300 members and guests attended the week-long 68th semi-annual convention of the Society of Motion Picture & Television Engineers which was concluded at the Lake Placid (N. Y.) Club on Oct. 20. Developments in the motion picture and Tv fields, with the latter getting by far the greater attention, were described in 52 technical papers.

Peter Mole, of Mole-Richardson, manufacturers of arc lamps and other studio

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equipment in Hollywood, was elected president of the Society for the next two years, succeeding Earl Sonable, 20th Century-Fox. Bill Kunzmann, convention vice-president, announced that the next Society meeting will be held at the Hotel Statler, New York, from April 30 to May 4.

Single Annual Convention?

The possibility of a single national convention in the future, rather than the two now conducted annually, will be considered by the incoming officers.

The Progress Medal was awarded to Dr. Vladimir K. Zworykin, RCA, for his invention of the Tv iconoscope; the Samuel L. Warner Memorial Award went to Dr. Charles Fordyce, Eastman Kodak, for his research work on tri-acetate (safety) film, while the SMPTE Journal Award was given to Dr. Frederick Kolb for his work on the air-cooling of film for higher screen illumination.

The Spontaneous Ignition of Decomposing Nitrate Film

IN IP for August last (p. 10) appeared the article "Spontaneous Ignition of Decomposing Nitrate Film," which originally was a contribution to the technical papers program of an SMPTE convention.* This article attracted widespread interest and comment by all those who oversee the storing and general handling of nitrate stock in laboratories, film storage vaults, exchanges and theaters.

Particularly voluble in this respect were those who direct laboratory activities, and from the various contributions made to the SMPTE Journal on this topic IP has selected the appended excerpts as being the most interesting. One of the contributors, Joseph H. Spray, directs lab activities for Warner Brothers; while James W. Cummings, of the National Archives, was a co-author of the original article. The exchange follows:

By JOSEPH H. SPRAY

There is no doubt, as the authors state, that deterioration of film caused mainly by faulty processing can be a source of spontaneous combustion, but this does not tell the entire story. Spontaneous fires can also start in cellulose nitrate film without the preliminary warnings detailed in the excellent photographs appearing in the article.

We recently had a fire which took place with comparatively new film in which the gelatin had been removed by our usual washing process, and we know that this film was clean and free of any extraneous matter when it ignited.

My contention is that cellulose nitrate can contain higher degrees of nitration than is wanted for film, and this higher nitration at

times is one of the causes of spontaneous combustion, particularly with elevation of temperatures. I realize that this is an alarming statement, but it is borne out by my experience. The remedy is that the film should, therefore, be stored under proper conditions.

Insulation the Vital Factor

For one thing, film should not be stored in iron drums, as they are conductors of heat and rapidly transmit the heat from one drum to another in a vault filled with such drums.

The fundamental thing in designing vaults and containers, and in storing nitrate film, is insulation, not conductivity. Insulation is obtained by separating quantities of film one from the other with a nonconductor, such as asbestos, wood, cardboard, plastics and other insulating material. Conductivity is obtained by storing the film in metal cans, on metal shelves, and in metal containers, such as steel drums. In other words, film should be kept away from metal as far as is practical, and surrounded only by nonconductors such as those enumerated.

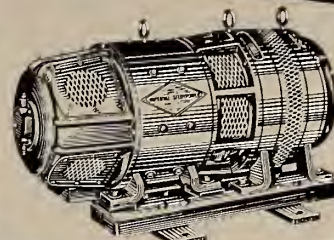
If, under these ideal conditions, a film does ignite or explode, due to deterioration from one cause or another, the fire is then confined to a small area.

By JAMES W. CUMMINGS

We do not doubt that, under certain unusual conditions, new film can ignite spontaneously. Spontaneous ignition is the result of two phenomena: heat generation and heat dissipation. Heat is usually generated by some exothermic chemical reaction and is dissipated by conduction, radiation, and connection to the surroundings. When the rate of heat generation exceeds that of heat dissipation, the temperature of the material rises until ignition occurs.

We understand that in Mr. Spray's plant

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the emulsion was removed from cellulose nitrate base film by washing in a hot caustic soda bath. The washed film was then cut to lengths and packed. The soda-ash residue that remains along with the film may react with it to generate more heat than is usually the case. Also, because of higher temperatures which prevail in certain parts of the plant, heat may not be dissipated as rapidly as desired. Under such conditions, material may self-ignite when it would not do so in normal storage.

Question of Excessive Nitration

Our paper was written with an eye toward the prevention of fire in libraries and film exchanges. We still believe that under conditions prevalent in such installations, new film will not self-ignite.

Mr. Spray's contention that excessive ni-

tration may be a cause of spontaneous ignition is interesting and should not be dismissed without careful study. However, there is the belief that because of the modern quality control methods used in the manufacture of nitrate film, a uniform product results. Besides, if variation in the degree of nitration does exist, it has not been proven that the autogenous ignition temperature will be affected. These two factors would have to be studied to confirm or deny the correspondent's hypothesis.

We do know that Bureau of Standards investigators were unable to cause the spontaneous ignition of new film at ambient temperatures of up to 120° F.

We wholeheartedly agree with Mr. Spray that all nitrate film should be stored in insulated facilities under controlled temperature conditions. Engineers . . . have devised insulated racks which can, without the aid of sprinklers, contain a film fire to the reel in which it originated.

Organizations storing quantities of nitrate film should consider, as a long-range project, the equipping of their facilities with this type of rack. Such a program may take years to execute, however, and will not reduce the danger of film fires in the near future. For that reason we recommend that procedure as outlined in the paper as being the only practical first aid solution to the problem for the immediate future.

By JOSEPH H. SPRAY

It is noted that the words "the soda ash residue that remains . . ." ignore my previous statement that ". . . this film was clean and free of any extraneous matter when it was ignited."

There is absolutely no sodium hydroxide (or soda ash, as some call it) present on the washed and dried film because the material receives a very thorough cleaning, both

mechanically and by washing; and it is well known that sodium hydroxide is very soluble. Furthermore, any minute trace that might be present would cease to exist as sodium hydroxide and would be converted into the products of reaction between it and the gelatin, and any that might still then be left would be changed into sodium carbonate, also very soluble.

The chance of accidental contamination with sodium hydroxide is quite remote because of the method of the washing of the film.

Mr. Cummings describes the control in nitration as so accurate that there would be very little chance of over-nitration.

Perfection-Minus in Controls

Without going into too involved a chemical explanation, it is readily conceivable that cotton, being a natural product, does not always produce cellulose in exactly the same way; differences due to soil, weather, accidental injury to the plant and other factors would tend more or less to alter the cellulose, and it is quite possible that under these varying conditions some cellulose of the cotton might be susceptible to further nitration.

The writer has seen a blowout occur right at the nitrating spot in a chemical plant. The operators thought nothing of it, saying that it was a thing to be expected. The nitration kept right on regardless of the blowout because the plant was constructed in such a way that it could take care of it. Why did the blowout occur if the control is so perfect?

It is realized that spontaneous combustion due to high nitration is fortunately rare, but who knows exactly how rare? The point to stress is that with such a substance as cellulose nitrate, the storage conditions should be such as to insulate the fire when it *does* occur, a general point on which both the writer and Mr. Cummings agree.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233).

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R. A. ENTRACHT, Business Manager
Sworn to and subscribed before me this 10th day of October 1950.

(Seal) ANNE CORRAGAN

Notary Public, State of New York, No. 31-5824300, Qualified in New York

Commission expires March 30, 1952.

Cost of Tuberculosis in 1950

By DAVID T. SMITH, M.D.

Each year at this time IP is glad to devote space to aid the sale of that "mighty mite," the Xmas Seal, which has done so much for so many afflicted with the dread scourge of tuberculosis.

Everybody is delighted with the steady decline in the death rate from tuberculosis from approximately 200 per 100,000 in 1900 to less than 30 in 1949. Unfortunately, the death rate is no longer a trade guide to the seriousness of the tuberculosis problem in this country. We must shift our vision from the dead to those who are living and suffering with the disease. The number of living patients has not declined proportionately to the decrease in death rate. In many areas, where the usual methods of case findings have been supplemented by mass X-ray surveys, temporarily at least, the number of new reported cases has been increasing while the death rate was declining.

Tuberculosis remains the No. 1 health problem in the United States. Although it is not at present the No. 1 killer, it is the No. 1 killer which is *known to be preventable*. Cost of the tuberculosis control program in the U. S. has been estimated by the National Tuberculosis Association at \$350,-

000,000 yearly. This enormous cost cannot be eliminated until we have eliminated tuberculosis. Temporarily we must spend more to find persons who have the disease but may not know it and may be spreading tuberculosis as well as losing their own health. We must find these persons in order to reduce in the future the enormous cost of treating patients with active disease.

Funds Woefully Inadequate

Funds raised by the Christmas Seal campaign cannot be used for the treatment of active tuberculosis. Not only are Seal Sale funds totally inadequate to take care of the cost of treating tuberculosis (the \$20,000,000 raised last year would provide not more than two week's care for the estimated 500,000 persons with active tuberculosis in this country) but they are needed for other purposes.

Seal Sale funds are used for education, stimulation of case finding, stimulation of rehabilitation programs and for statistical, social and basic laboratory research, all of which are essential for the discovery of newer and better methods which will speed the elimination of tuberculosis from the United States. Thus, money spent for Seals today will in the future help to cut down the tremendous costs of tuberculosis.



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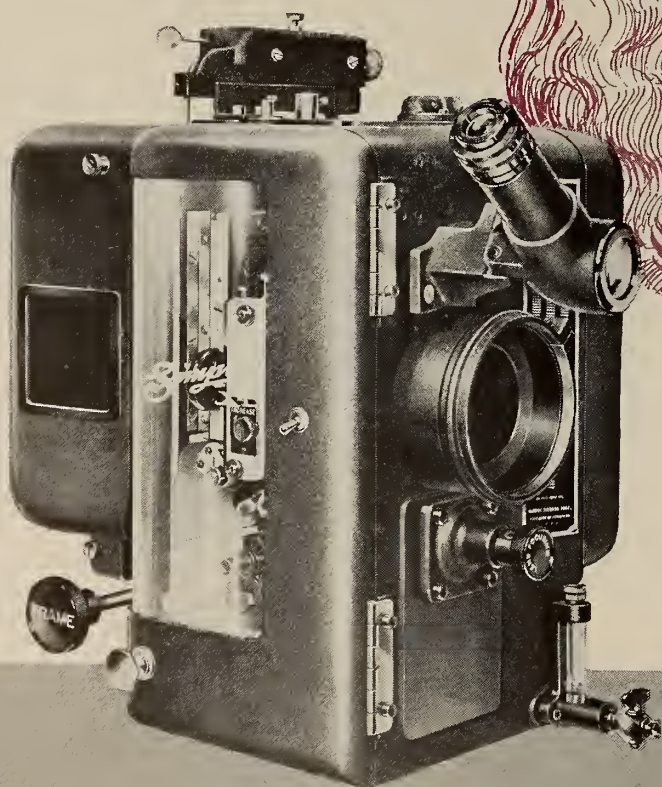
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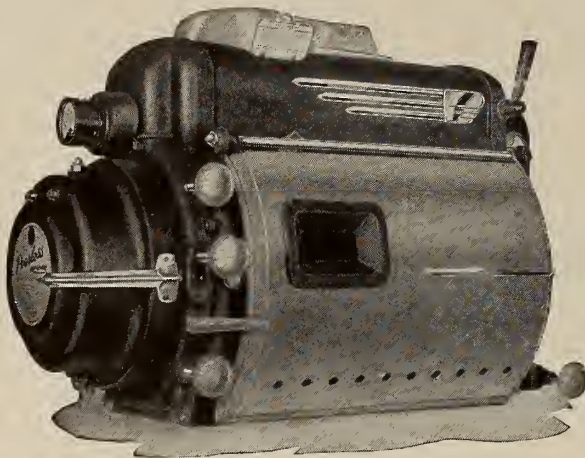
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HENRY B. SELLWOOD, *Editor*

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DECEMBER, 1950

Number 12

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MONTHLY CHAT

LOOKING back over the year now fast drawing to a close, one is struck by the dogged determination of the industry's technical forces and particularly the equipment manufacturers, to keep moving ahead on all fronts, ranging from improved studio technique right down to advanced design for reproduction equipment. This forward-looking attitude by the technicians is in sharp contrast to that displayed by exhibitors, whose do-nothing policy in the face of serious, possibly fatal, competitive threats over the past three years has been punctuated by mournful soundings which all too often emanated from a public rostrum and served only to complicate rather than ease the motion picture's economic plight.

The exhibition field now entreats the "technicians" whom it has ignored, if not actually scorned, for many years to step into the breach and come up with a development of such magnitude as will insure the continuing prosperity of the theaters—snap! just like that. What these potential pall-bearers fail to realize is that such developments require money, lots of it, and such sums are not readily available from the usual sources at this time—largely because of the industry's self-deprecation.

The sad part about this situation is that such developments *could* be applied within the near future, notably improved color processes, stereophonic sound, and three-dimensional pictures—but the necessary wherewithal is not at hand simply because the exhibition field never made it available.

Excepting sound reproducing equipment (which was a do-or-die proposition for exhibitors) projection units have always been distributed in strictly a buyer's market, this despite the recent yelps from exhibitors that equipment prices are too high. The visible appurtenances of a theater, from marquee and lobby through to the stage, were invariably given preference by Mr. Exhibitor. But when the unseen and little understood visual and sound equipment was being purchased, price-cutting and "deals" were rampant. Exhibitors never acknowledged the fact that projection equipment was the guts of their theaters.

The cold-turkey fact is that projection equipment has always been underpriced. Had it not been, there would have been available through the years that nice cushiony profit margin a portion of which could have been plowed back into research and development which today would be bearing toothsome fruit for the exhibition field.

But Mr. Exhibitor decreed it otherwise. Today the theater cupboard is bare because those very developments which could provide its sustenance are barred from making the transit from manufacturer to theater by the lack of dollars which exhibitors themselves sheared off a legitimate sales profit. 'Twas ever thus: water the leaves and neglect the roots, and thereby create a famine.



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Maintenance and Servicing of Motors

FIGURE 4B is a diagram of a 3-phase induction motor. This diagram looks very much like that of a 3-phase synchronous motor, but careful comparison of the two drawings will reveal some notable differences. The D.C. exciting dynamo and the slip rings are missing from the induction motor. How is the rotor of the induction machine magnetized?

The transformer is a device familiar to all projectionists. An induction motor is simply a transformer with the secondary coil fastened to a free-turning shaft. When A.C. is passed through the primary windings (the stator), currents are induced in the windings of the rotor. A 3-phase synchronous motor could be changed into a 3-phase induction motor by simply short-circuiting the two collector rings and eliminating the exciter.

A 3-phase induction motor is really simpler than a single-phase induction motor. It starts itself—something that a single-phase induction motor cannot do without adding extra windings and auxiliary apparatus. The motor of a motor-generator set is usually a 3-phase induction motor. It has no brushes, commutators, slip rings, centrifugal switches, or other complicated mechanical parts to get out of order.

'Star' or 'Delta' Connections

The stator windings of a 3-phase induction motor may be "star" or "delta" connected, as shown. Each phase flows through only one-third of the total winding. This arrangement results in a rotating magnetic field which starts the rotor turning and drags it around faster and faster until it attains full speed.

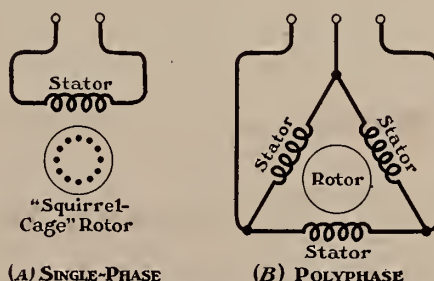
The rotor may have windings consisting of many turns of wire around the pole-pieces, or else be of the squirrel-cage type. Squirrel-cage rotors consist

By ROBERT A. MITCHELL

II. Induction Motors

of many bars of copper fastened at the ends by copper short-circuiting rings. The entire squirrel cage is embedded in a cylindrical core of laminated iron. The main point to remember is that both types of rotor work on the same principle. They are magnetized by currents induced in them by the alternating magnetic field of the stator.

As the rotor of an induction motor comes up to speed, the current induced in it falls in frequency (because it is more nearly in step with the line frequency—synchronism) and hence decreases in intensity. The rotor can never attain truly synchronous speed because, if it did so, the induced current would fall off to nothing! And it is the induced current in the rotor which keeps the motor running.



(A) SINGLE-PHASE

(B) POLYPHASE

FIG. 4. Single-phase and three-phase induction motors. The single-phase motor will not work unless provision is made to start the rotor turning. The three-phase motor starts itself because the revolving magnetic field drags the rotor around with it.

The difference between the speed of an induction motor at full load and truly synchronous speed, expressed as a percentage, is called the "slip." Slip varies from 1 or 2% in large induction motors to 10 or 20% in very small machines.

The direction of rotation of a 3-phase induction motor can be reversed by interchanging any two of the three input wires.

SINGLE-PHASE IND. MOTORS

Figure 4A illustrates a single-phase induction motor having a squirrel-cage rotor. This motor is the basis of all single-phase motors—the most commonly used motor for projectors, rewinders, ventilating fans, curtain controls, etc.,—but in this elementary form it has no starting torque. The magnetic field of the single-phase stator does not rotate but merely oscillates.

A number of hook-ups have been devised to make the single-phase induction motor self-starting. "Split-phase," "capacitor," and "repulsion-induction" are some of the names applied to self-starting, single-phase induction motors of the various types.

Induction motors have the very desirable shunt-motor characteristic of nearly constant speed over wide variations of load.

SPLIT-PHASE MOTORS

As stated previously, polyphase induction motors are self-starting because the magnetic field of the stator rotates. By "splitting the phase" a similar rotating magnetic field can be produced in single-phase induction motors, thus providing them with starting torque. There are two common methods of splitting

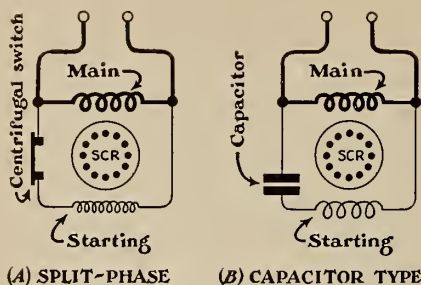


FIG. 5. "Splitting" single-phase A.C. into two-phase current in order to create the revalving magnetic fields which make these induction matars self-starting.

single-phase A.C. into 2-phase current.

The simple split-phase motor has two stator windings (Fig. 5A). In actual construction these two windings are distributed so that their poles are 90 magnetic degrees apart. The main, or running, winding has low resistance and high inductance. The other stator winding, called the starting winding, has high resistance and low inductance.

The differences in the resistance and inductance of the two windings creates a phase displacement approximating 2-phase current. As the current in the running winding decreases, weakening its magnetic effect, the current in the starting winding increases, strengthening its magnetic field. The result: a rotating magnetic field which drags the rotor around.

If the starting winding were left in the circuit all the time that the motor runs, it would burn up. To prevent this, the motor is provided with a centrifugal switch which cuts out the starting winding when the motor is about two-thirds up to normal speed. The centrifugal switch consists of a governor which separates the starting-switch contacts by sliding in or out, depending upon the make of the motor.

A variable resistance is interposed in the starting-winding circuit of some split-phase induction motors, permitting the starting torque of the motor to be varied within limits. Split-phase induction motors of $\frac{1}{4}$ h.p. capacity are widely used for driving projectors.

CAPACITOR MOTORS

The use of a large condenser in series with the starting winding is the other phase-splitting method. In certain induction motors of the capacitor type the starting and running windings are similar as to resistance and inductance, thus eliminating the need for a centrifugal switch. Many capacitor motors have a resistor in series with the capacitor; others have two capacitors, one for starting and the other for running.

Without the capacitor, the motor represented by Fig. 5B would not start inasmuch as the current in both stator

windings would be "in phase". The capacitor throws the current "out of phase" in one winding, thus creating a 2-phase rotating field.

In general, capacitor motors are more expensive than ordinary split-phase motors, but they have more powerful starting torque and higher running efficiency, and also cause less radio and sound-system disturbances. Capacitor motors of $\frac{1}{4}$ h.p. rating are excellently adapted to the driving of projectors.

REPULSION MOTORS

A repulsion motor is simplicity itself. In fact, a D.C. series or universal motor can be converted into a repulsion motor by connecting the field windings to a source of A.C. and short-circuiting the brushes. As shown in Fig. 6, there is no connection between the armature and the stator windings in a repulsion motor.

The position of the brushes on the commutator is very critical. At a certain position, called "hard neutral," the motor will not work at all. Opposing magnetic fields are set up in the armature. If the brushes are shifted to one side of hard neutral, the motor will turn in one direction; if shifted to the other side, the motor will turn in the opposite direction. It is therefore a simple matter to reverse the direction of rotation of a repulsion motor.

The repulsion motor gets its name from the fact that its torque is developed by the repulsion of "like" sets of poles. The poles created by the induced current in the armature have the same polarity as the nearest stator poles.

Straight repulsion motors are seldom found in theatres. They are useful chiefly in applications where very high starting torque is required. Like series D.C. motors, they lose considerable speed as the load increases.

Repulsion motors are of interest to the projectionist primarily as the starting device used in induction motors of the repulsion-induction type.

REPULSION-INDUCTION MOTORS

Motors of this class are properly called "repulsion-start, induction-run" motors. The repulsion component is ordinarily used only to start the single-phase induction motor.

Figure 7A illustrates the arrangement

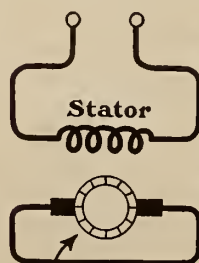


FIG. 6. A self-starting repulsion motor. Any D.C. motor may be converted into an A.C. repulsion motor by disconnecting the brushes from the field (stator) and short-circuiting them. Arrow indicates armature with brushes short-circuited.

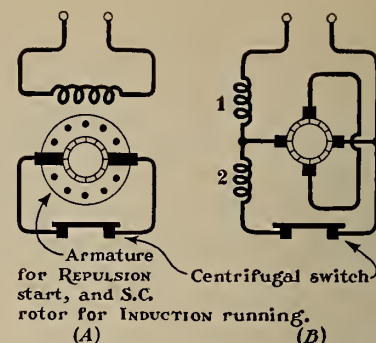


FIG. 7. Repulsion-induction matars. These matars utilize the repulsion principle far self-starting. When nearly up to normal running speed, the centrifugal switches operate, causing them to run as straight induction matars.

easiest to understand. This motor is actually two motors combined: one repulsion and the other induction. This motor starts as a simple repulsion motor, but when nearly up to speed, the centrifugal switch operates, breaking the repulsion armature circuit and permitting the motor to run as a squirrel-cage induction motor.

Another arrangement (not illustrated) utilizes a flexible short-circuiting ring consisting of a large number of small copper segments. When the motor is nearly up to normal speed, the commutator is short-circuited all the way around, causing the motor to run as an induction motor with a wound rotor.

Figure 7B shows still another repulsion-induction arrangement. The top and bottom brushes are short-circuited to give repulsion starting. When the motor is nearly up to speed, the centrifugal switch closes, causing some of the armature current to be shunted through an additional set of stator coils. The motor then runs mainly as an induction motor.

This by no means exhausts the number of varieties of repulsion-induction motors; but the three types described are representative of motors enjoying widespread use for pumps, furnace-blowers, printing presses, and other machinery requiring a higher starting torque than split-phase and capacitor induction motors can furnish. Repulsion-induction motors are also used on motion picture machines, although projectors do not require so powerful a starting torque.

It must be pointed out that the rotors of all single-phase induction motors revolve in the direction they are impelled by the starting apparatus. In the case of split-phase and capacitor motors the direction of rotation cannot be changed without making rather serious alterations in the stator windings. Repulsion-induction motors, on the other hand, are readily reversed. All that needs to be done is to shift the short-circuiting brushes to the opposite side of "hard neutral."

[To be Continued]



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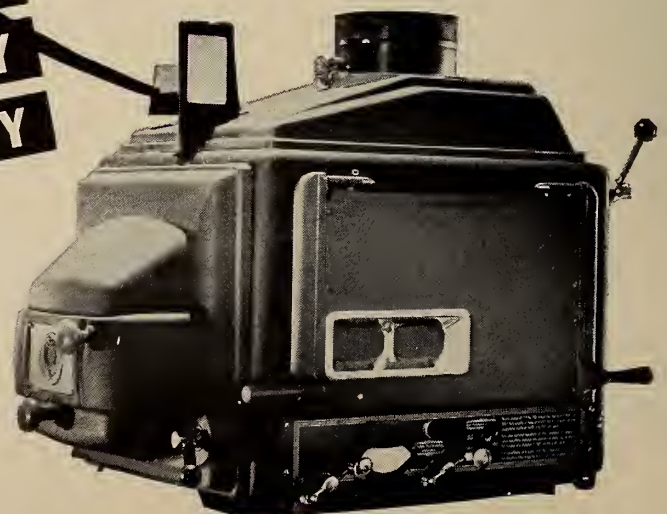


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I. Signal Sources and Signal Transmission Methods

THERE is one basic difference between a television picture and a picture projected from film; the film picture is sent to the theater some time before the start of the show, and is shipped complete. All the individual frames are on the film, and are projected one after another as complete pictures on the screen as the film is run through the projector.

The television picture, on the other hand, is broken down into tiny pieces or "bits" and each is sent to the theatre individually and separately from any other. Each bit is immediately projected to its proper place on the screen as soon as it is received. Each individual frame is built up, bit by bit, on the screen; at no time is there even one complete frame being projected on the screen. Therefore, it is extremely important that nothing be permitted to interfere with the transmission of these individual bits of picture information. They are transmitted at an extremely rapid rate; the RCA PT-100 theatre television projector is capable of projecting *eight million* of them on the screen each second!

These bits of picture information are obtained from a television camera, which is at the scene to be transmitted, whether it be "live" or taken from film.

Transmission From a Studio

If the scene is in a studio, the procedure is very similar to that which takes place in a motion picture production unit, but with the important difference that there can be no retakes. As each bit of picture information is transmitted immediately to the theater television projector, any errors or failures on the part of the studio personnel or equipment are shown on the screen as soon as they are made. This requirement, of course, makes it imperative that the studio personnel be very well rehearsed.

Lighting of a television studio need not be as bright as that required for film studios, inasmuch as the sensitivity of the television cameras is much greater than that of film cameras. Several cameras are ordinarily employed in television studios, as in film studios, to per-

mit "shots" from different distances and angles.

The studio director has one great advantage over the film director, however, since he can watch, on several monitor receivers, the scenes being taken by all cameras, and he can immediately select the proper camera to use for the best pictorial and dramatic results. Switching from camera to camera is accomplished instantaneously, like changing projectors at the ends of reels, and produces no break in the action on the screen.

Transmission From a 'Remote'

If the scene to be transmitted is not in a studio (such as a sports event broadcast or similar event of general interest) the cameras are placed in as favorable a location as can be obtained. In such cases, advance arrangements can usually be made to place the cameras where they will get the clearest and best picture possible.

Distance from the action is no drawback, provided the air between camera and object is clear, because telephoto lenses are used to enlarge the scene to the proper size. However, the camera must be free from vibration when telephoto lenses are used, because the large magnification will magnify the effects of any vibration.

Skillful camera manipulation is re-

quired which cannot be rehearsed like studio presentations. The director and the cameraman must be able to anticipate the action to a certain extent, and have a camera in position to catch it as it happens. Thus, there will not be noticeable gaps in the action due to slow camera pointing or focusing.

The commentator must be in position to see the camera picture on a monitor screen as well as the action itself so that he can modify his comment as necessary, by explaining and correlating any pertinent occurrences outside camera range in order to make it smooth and intelligible to those who see only the picture. Critical observers soon learn to detect skillfully handled cameras and smooth direction as compared with amateurish presentations.

Transmission From Film

If the picture is to be obtained from film, the film to be televised is run through a special projector used to project film pictures taken at 24 frames per second into an Iconoscope camera which transmits information at the rate of 30 frames per second. The 30/24 frame speed ratio reduced to its lowest term is the ratio 5/4. This speed conversion cannot be made by running the projector at a film speed of $30/24 \times 90$, or 112.5 feet per minute, because the speed of the

RCA television camera equipped with telephoto lens, as shown in action at a sports event.



reproduced action on the screen, and also the pitch of the reproduced sound, would rise in the same proportion.

The change may be made, however, in a simple but ingenious manner. This is done by projecting one frame of the film *twice* into the Iconoscope, as in a standard projector; however, the next film frame is held stationary for a period 50% greater and is projected into the Iconoscope *three* times. This gives *five* Iconoscope pictures, instead of the usual *four* from two film frames. This produces the required frame speed increase. The following, or 3rd frame, is projected *twice* again in the normal manner, and the next, or 4th, frame is held 50% longer and projected *three* times.

No Irregularity Detected

Because the projector must pass 24 frames per second in spite of the extra time every second frame is held, the *intermittent mechanism and shutter* only must run faster than normal by the 5/4 ratio. The film feed sprockets, soundhead, *etc.*, run at normal speed. The extra time during which every second frame is held is undetectable in the resulting television picture.

The RCA television projector does not have a rotating shutter. The effect of a shutter is produced by using an intermittent projection light source. This source is a gas discharge tube, which is flashed in synchronism with the vertical return of the Iconoscope beam at the end of each picture field, producing a very bright light of very short duration.

A special synchronous motor drives the projector so that the film pull-down always occurs between the flashes of the projection lamp.

Transmission Lines

No less important than the camera is the transmission link from camera to theatre television projector. In a studio a special type of electrical line, known as a "coaxial cable," is utilized. This is merely a copper wire which is kept in the center of a copper tube by suitable insulation. The tube may be solid copper, but to make it more flexible it is usual to make it out of copper braid. It is generally covered by rubber or plastic insulation.

A coaxial cable is used because it will carry the signal without excessive losses, which an ordinary telephone line will not do. However, it is bulky, heavy and expensive. Therefore, it is generally used only in fixed locations and in short lengths to connect the cameras, which must be movable, to the studio equipment.

Long lengths of this cable have been installed by telephone companies between some of the larger cities in the United States, and more are being installed rapidly. This is used for television, and also for "multiplex"



Control equipment racks for the RCA PT-100 theater television system.

telephony. (In the latter application, it can carry, at the same time, several hundred separate telephone conversations, without mixing them up.)

In some cases, it is possible to use an ordinary telephone line to carry television picture signals for a mile or so, but the loss of signal strength is a serious disadvantage. However, by telephone line a theatre television projector can be supplied with signals from the coaxial cable at the telephone office, provided the distance is short enough. Where the distance is too great, a coaxial cable can be installed from the office to the theatre when circumstances warrant the greater expense.

Direct Beam (Microwave) Channel

Another method of bringing the signal from the camera to the theatre is by means of a direct radio beam, or "microwave" channel. This makes use of the fact that short, high-frequency radio waves

travel in straight lines, like beams of light. Therefore it is possible to use small metal reflectors shaped like arc-lamp mirrors, but larger, to project these waves in a straight beam, like the beam of a searchlight, from one point to another, where they are collected in another similar metal reflector and concentrated into a receiver.

Naturally, the transmitter and receiver must therefore be located at two points which have no buildings, hills or other obstacles between them. The two metal reflectors are aimed at each other, and the radio waves, which are invisible, travel between them in a narrow path. They cannot be received at points outside this path; therefore, this method of transmission is not used for broadcasting.

UHF Relay Link

If two points cannot be found near the transmitter and receiver without obstacles between them, but it is possible to find a third point with no obstacles between it and either of the other two points, another pair of reflectors, with a transmitter and receiver, may be placed at this third point and used to receive the signals from the first point and re-transmit them to the second point, at the theatre. Such transmission is called "UHF relay link," or "beam link." As this requires the use of considerable relatively expensive equipment, and the services of a setup and operational crew, it also is rather expensive.

Such relay links are generally set up for only one event and taken down for use elsewhere after the event is over. On the other hand, once a coaxial cable has been installed from a telephone exchange to a theatre projection room, it is generally left in place. In any case, the incoming signal is fed into the input of the theatre television projector.

[The next installment will treat with the path of the Tv signal through the projection equipment.]

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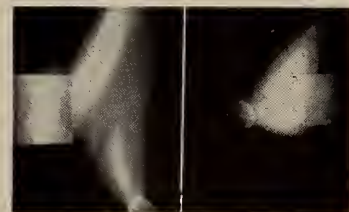
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Lacquer Coating for Cine Film

By FREDERICK FOSTER

Tremendous savings and the effective preservation of valuable subjects are possible through a new method of lacquer coating for cine film, as originally reported on in *American Cinematographer*. Two conveniently located plants are available for this work.

INCREASING use of motion picture film outside of the large, well-equipped motion picture studios, such as in the 16-mm and television film industries, has brought with it a number of problems for producers arising from handling. Two factors which tend to impair screen quality are film abrasion and oil mottle.

Abrasion or scratching is caused by careless handling of the film when re-winding the original negative from one reel to another; when handling the negative during the break-down process; when viewing the negative in a Moviola or other type of film viewer; or improper handling when projecting, cleaning, rewinding, code numbering, etc.

Oil mottle is another serious harmful effect which mainly concerns the positive or release print. Usually, oil mottle is the result of running a film through a projector which has been carelessly lubricated so that some of the excess oil is transferred to the film where it remains until it is removed by a suitable cleaning process. Too often it happens that oil that gets on a film during its initial screening and remains there for the entire life of the film, greatly impairing its screen quality, of course.

Dual-Purpose Lacquer Coating

The modern treatment of film—both color and black-and-white—as a protective measure against abrasion and oil mottle consists of coating both film surfaces with lacquer.

Lacquer coating affords many advantages which the practical-minded film user cannot ignore. Actually, no film surface will indefinitely resist abrasion and scratches: even treated film surfaces will become scratched. In this connection, however, lacquer coating provides a primary advantage, in that normal abrasions and scratches do not penetrate the protective lacquer coating to damage the film surface. Since the scratched lacquer coating may easily be removed and the film re-lacquered, indefinite protection is assured the film surfaces, and new print projection quality continues. This process can be repeated as long as the perforations are good, thus extending the useful life of the print.

The advantages of lacquer-coating negative footage and other original films, especially if quantity prints are to be made from them, is definitely obvious. In lacquer coating the producer has a film protection process equally effective for originals and production prints.

Film Lubrication Qualities

Lacquer coating possesses additional virtues. For example, since it seals in the normal moisture content of the film, shrinkage and brittleness are reduced and the film remains pliable, thus minimizing breakage hazards in projection. This same sealing action of the lacquer

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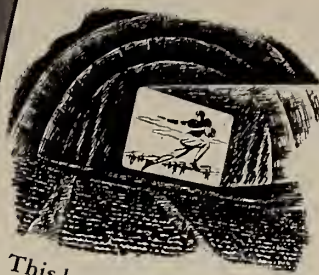
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coating tends to seal in the dyes in natural-color film.

Danger of first-run damage to recently processed film is virtually eliminated by lacquer coating. This is accomplished by the lubricating effect of the lacquer, which prevents chatter or strain on the perforations from emulsion gathering on the aperture or pressure plates. It is evident that by lacquer coating both sides of the film extra protection is achieved for films used in continuous projectors, and for any film likely to receive extremely hard use by extended running.

The disturbing projection quality due to noticeable flicker caused by oil mottle on the film is probably considered a more serious problem than occasional abrasions and scratches, which usually escape the observation of the average audience.

Transmission Level Improved

In coping with this problem, lacquer coating makes another distinct contribution to film protection and the requirements of quality projection. Screen flicker due to oil mottle on the film, for all practical purposes, is undetectable with lacquered films. Since the glossy lacquer coating and oil spots on the film possess similar light transmission characteristics, the screen effect of oil mottle is practically eliminated. It is the difference in the transmission properties of

uncoated film and oil spots that aggravates screen flicker. The foregoing indicates that the glossy lacquer coating may contribute to projection quality by added brilliance to the projected image. Oil does not harm lacquer-coated film, and it can be wiped off easily without damage to the film. In similar fashion, finger prints can be cleaned easily from lacquer-coated film.

A surface coating with all the protective attributes and advantages already discussed may be presumed to be expensive in application. On the contrary, lacquer coating is so inexpensive that every film maker, film library, and distributor hardly can afford to do without it. Lecturers, particularly those who pro-

ject original Kodachrome films with their talks, now are able to screen these films indefinitely when lacquer coated. In these instances, such films must be coated immediately after they have been processed and *before* they have been edited or screened for the first time.

Coating of both sides of such films presents an additional problem in splicing in that both the emulsion side and the base sides of the film ends must be scraped before applying cement.

Does the Coating Scratch?

The question often asked is "To what extent does such lacquer coating itself become scratched?" or "Does such coating scratch more or less readily than normal film surfaces?" Laboratory com-

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parisons have indicated that coated films have the same scratch resistance as untreated films. However, without a single exception, experience with these coated films in the field indicates that they are definitely more resistant to abrasion than uncoated films.

Two well-equipped companies offering this film coating service to both 16- and 35-mm film users are The Larsen Co. and Escar Motion Picture Service, Inc. The former is located in the Pathe Laboratory, 6823 Santa Monica Blvd., Hollywood; Escar is situated at 7315 Carnegie Ave., Cleveland.

Escar's coating machine consists of a chamber in which the stock to be coated is placed, wound on a reel, then driven past a roller-wick lacquer applicator. The film then moves into a drying chamber, in which clean air-flow and temperature are rigidly controlled, and finally emerges on an external takeup reel. Here the amount of lacquer applied is under precise control at all times.

Larsen offers special coatings for originals, release prints and lecture films. They recently made a field test to evaluate the effectiveness of their release-coat treatment under actual trade conditions. A feature picture was placed at their disposal and a portion of it given the re-



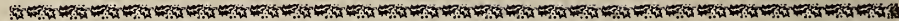
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lease-coat treatment at the time of release. The entire feature was then put into service and shown in all types of theaters. At intervals the print was returned to the Larsen laboratory for examination. Screen tests of the coated and uncoated sections clearly indicated that abrasion of the coated portion of the film was considerably less than that of the untreated portion.

Considering the tremendous savings afforded by such protection, the cost for lacquer coating is quite nominal, running around one or two cents per foot. In both the Escar and Larsen processes, the old protective lacquer coating may be removed and the film re-treated to give extended service.

Admission Taxes Dip Again

General admission tax collections in October, reflecting September business, were a trifle less than those for October a year ago, the Bureau of Internal Revenue reported. October collections were \$35,036,535, about \$35,000 less than for a comparable period in 1949. Collections for both August and September this year were off sharply from the 1949 level.

Display Second Oldest Camera

The second oldest camera produced for photographic use, an 1841 Voigtlaender, is now on display at George Eastman House in Rochester, N. Y. It is considered a companion piece to the photographic institute's 1839 Giroux camera, the first camera put on the market.



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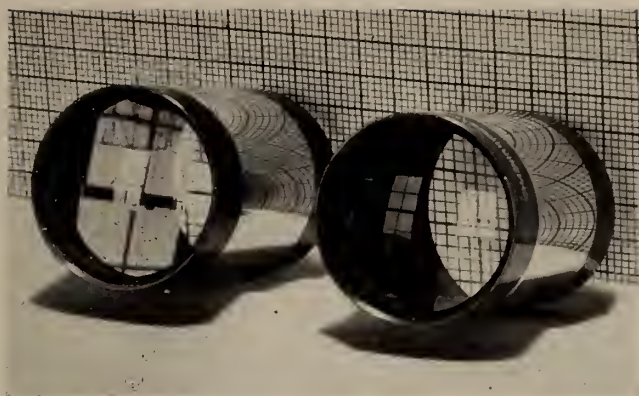


FIGURE 2

Comparison of uncoated (left) and coated projection lenses, showing marked reduction in reflections and freedom from glare in the coated lens at the right.

The Hows and Whys of Coated Optics

By DEAN A. LYON

COATED OPTICS, HOW THEY GOT THAT WAY AND WHAT THEY ACCOMPLISH IN TERMS OF VASTLY IMPROVED PERFORMANCE WHEN THEY GET THAT WAY IS DESCRIBED HEREIN BY THE HOLDER OF THE BASIC PATENT FOR THE COATING PROCESS ADOPTED BY THE UNITED STATES ARMED SERVICES.

"LENS coating" is the name given to a process for applying an exceedingly thin, transparent film of magnesium fluoride to the surface of a lens in order to reduce the reflection of light therefrom, as well as to increase the transmission of light through the lens. In England, the process is referred to as "blooming" and a coated lens is said to be "bloomed".

The film on a properly coated lens is not quite four one-millionths of an inch thick. Inasmuch as the human mind finds it difficult to grasp the significance of such infinitesimal quantities, a few comparisons may make it clearer. The paper on which this article is printed is about .003 inch thick. Even this minute thickness, however, is almost 800 times thicker than the film on a coated lens!

Nevertheless, these almost insignificant films effect a startling improvement in the performance of optical instruments. The Army alone coated about 600,000 square inches of lens surface every 8 hours at the peak of production.

Who, What, How, Why

Who invented coating? How are the films applied? Why does the film function as it does to improve the performance of optical instruments? What specific benefits are derived from coating?

The first observation that a thin film on a lens actually improved its perform-

ance was made more than half a century ago (1892) by Taylor, the famous English lens designer. To his astonishment, lenses which had been slightly etched by the long-time action of atmospheric moisture reflected less light than a freshly-polished specimen. He then discovered that similar films could be formed by a number of chemicals. The idea, however, was quickly buried in the literature through lack of interest.

The same idea was rediscovered by Kollmorgen in the U. S. A. at the time of World War I; and F. E. Wright, then

on duty with the Army, clearly saw the application to military instruments. Popular prejudice against a process which formed any film on a lens was so strong, however, that it again sank into oblivion.

Not until 1935 did Dr. John Strong of the California Institute of Technology, devise an entirely new procedure for applying a film. Whereas the previous processes were chemical in nature, Strong's process was physical. He showed that if calcium fluoride was evaporated in a high vacuum and then condensed as a thin film on the surface of glass, the combination would reflect less light than the bare glass.

Strong's method is the basis for the present-day process, although a few refinements have been added to make the film adhere tenaciously to the glass. It has also been found, after much experimentation, that magnesium fluoride, rather than calcium fluoride, provides the best film. Modern films are therefore generally made from this material.

Magnesium fluoride, when pure and in large crystals, is as transparent and clear as the finest plate glass. When ground into a powder as used for coating, it is white. It neither melts nor evaporates appreciably until it reaches a temperature of about 2700 degrees F. Hence, means must be provided in the coating machine to heat the fluoride to this temperature. One of the secrets which contributed to the success of lens coating was the discovery that the lenses themselves should be hot (about 400° F.) when the vaporized fluoride condenses on them—in a high vacuum, of course.

When fluoride strikes such a hot surface, it produces a very hard, durable film which will withstand considerable abrasion and soaking in water and many chemicals without damage. A film which is formed on a cold lens surface can oftentimes be wiped off with a cloth and readily removed by soaking in water for a short time.

When the operator is ready to apply a



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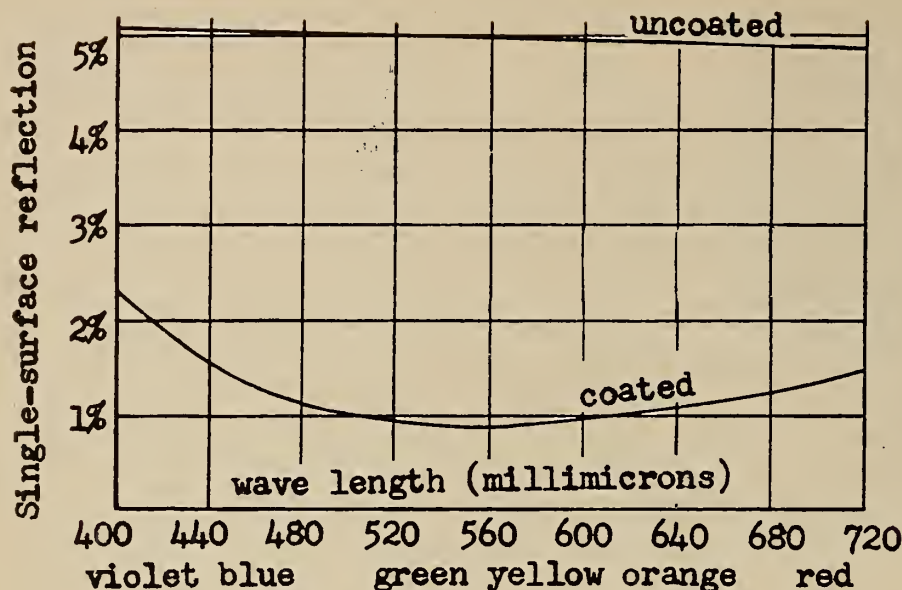


FIG. 2. Chart showing relative loss by reflection of coated and uncoated surfaces.

film, he holds a small fluorescent lamp above the lenses in a bell jar and looks at the light reflected from the lens surface. As the film increases in thickness, the reflected light changes in color, beginning with very light yellow and progressing through yellow, brown, reddish-brown, pink, and reddish-purple. When the latter color appears, the film has attained its proper thickness and the process is stopped.

If a film beyond the reddish-purple is applied, the colors go through deep purple, blue, blue-green, and finally become green. All coated lenses which show blue-green or green reflections are badly overcoated. A green reflection indicates a film which has double thickness and is scarcely more efficient than an uncoated surface.

Loss of Light Energy

Reflection represents a loss of light energy. It can be demonstrated mathematically that if the reflection loss is eliminated, the energy which is thereby saved now goes through the instrument as useful image-forming light. The efficiency of the instrument has thereby been improved, since it now transmits more light. In technical parlance, its "light transmission" has been increased.

Inasmuch as ordinary white light—daylight, for example—is compounded of light waves having many wave-lengths, the wave-length to be eliminated must be selected. The human eye is most sensitive to yellowish-green light, which has a wave-length of about .000022 inch. It follows logically that the film thickness must be adjusted so that the maximum amount of light of this wave-length will be transmitted through the instrument in order to utilize the high sensitivity of the eye at this point.

This high transmission to yellowish-

green light can be obtained by adjusting the film thickness for minimum reflection of this color. When this is done, all other colors corresponding to different wave-lengths will be reflected more than yellowish-green, since the film has a finite thickness and can be $\frac{1}{4}$ wave-length thick for only one wave-length. A reflected residue rich in blue and red remains, and together they appear reddish-purple.

This effect is shown in Fig. 2, where the straight line represents the reflection

from an uncoated, clear glass surface. The fact that it is practically horizontal shows that it reflects light of all colors almost equally well and therefore the reflected light has the same color as the incident light. The curved line shows the reflection from a coated glass surface.

It should be noted that red and blue at the two ends are reflected more than the middle region where green and yellow lie. More important, however, is to note that the reflection from the coated surface at the optimum point is hardly more than $\frac{1}{6}$ that of the uncoated glass. The area between the curve and the straight line is a measure of the energy which has been saved and is now available to increase the "transmission" of an instrument.

Percentages of Transmission

A single surface of glass reflects from 4 to 6% of the incident light, the exact amount being dependent upon the type of glass. It therefore transmits 96 to

Season's Greetings

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NEW YORK 63, N. Y.

Season's Greetings

to the thousands of craftsmen whom
we have been privileged to serve
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C. S. ASHCRAFT MANUFACTURING CO.

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ARC LAMP SPECIALISTS FOR MORE THAN A QUARTER CENTURY

Holiday Greetings From

CAMERAMEN'S LOCAL NO. 659

I. A. T. S. E.

HOLLYWOOD

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94%, respectively. Since it can never transmit more than 100%, it is readily seen that the coating of a single surface does not effect much of an improvement. Inasmuch as most optical instruments are made up of several glass elements, each of them having two surfaces, we must look for the big improvements in the multiple-element systems where the coating will save 3 or 4% of the incident light at *every* surface.

An exaggerated but practical example is a submarine periscope. This instrument has about 36 coated surfaces. Prior to coating, the light loss was so great that only 10 to 14% of the light entering the periscope finally reached the eye of the observer. After all surfaces had been coated, 45% of the light reached the observer. The transmission of the instrument had been tripled or quadrupled.

Greatly Enhanced Image Clarity

Even more important than the increased transmission, however, is the improvement in clarity noted with coated lenses, and contrast in the image which is the result of the lowered reflection losses. The light which is usually lost at the uncoated surfaces in an instrument merely reflects back and forth among the elements, and much of it finally reaches the eye as a diffuse haze which detracts from clarity and sharpness in the image. When all these reflection losses have been greatly reduced by coating, the improvement in clarity and sharpness of the image is remarkable. Fine details in the target becomes sharp and distinct.

It is this substantial improvement in crispness of detail which is the basis for the favorable acceptance of coating, rather than the increased transmission. Increased transmission is of primary value when light intensity is low, but enhanced crispness of the image is present at all times.

Another beneficial effect of lowered reflection losses is the virtual elimination of "ghost" images and "flares" which result when a brilliant source of light is in the field of view. Thus it is possible to view objects which are almost directly

in line with the sun without experiencing flares or ghosts.

Care of a Coated Instrument

The care of a coated instrument need be no different from that accorded any fine optical instrument. Properly applied coatings will *not* be removed by soap and water or organic solvents such as alcohol, naphtha, ether, carbon tetrachloride, or benzene. The outside surfaces receive the greatest abuse, since they are cleaned frequently, whereas the inside surfaces are never touched.

It must not be expected that a film only four one-millionths of an inch thick will never wear off when cleaned frequently. The hardest film will eventually wear away. The moral is to clean the

surface as gently and infrequently as possible. Use clean soft cloth, lens tissue, or a cotton swab.

One of the quickest ways to damage a film is to scrub it with gritty cloth—such as a handkerchief which has picked up particles of sand and grit in a pocket. Particles of sand will scratch uncoated glass, but the scratches will not appear so bright as an identical scratch in a film. A scratch in a film stands out prominently against the low reflecting background because the film has been removed, thereby restoring the reflection to that of uncoated glass. A few scratches in a film do no harm, as the area exposed by them represents such a small proportion of the total coated surface that they will have no effect whatsoever on the quality of the image.

Finger marks or any greasy films on a coated surface stand out prominently and manifest themselves by a myriad of color variations on the surface similar to an oil film on water. This color effect is a normal consequence of one film (grease) on top of another thin film (coating). The cure is to remove the greasy film with clean alcohol.

If the user will observe the few simple precautions described herein, there is no reason why properly applied films should not give many years of perfect service.

★ ★ ★

Season's Greetings

NATIONAL CARBON DIVISION

Union Carbide and Carbon Corporation

NEW YORK

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

THE conductor of this department regards himself as merely the transmission link between those spirited craftsmen whose constant effort to keep their co-workers supplied with useful and interesting information makes possible the publication of this section. At the year's end, during this Holiday Season, we are acutely conscious of our indebtedness to the many friends who by their kindnesses and courtesies have eased our path during the past year.

To all those who have been so gracious and helpful we extend the heartfelt wish for a joyous Holiday Season and for happiness and security in the year that lies ahead.

- A major development in the long and bitter Hollywood labor fight, growing out of the 1946 studio strike, occurred early this month when the Federal District Court in Los Angeles granted a motion by attorneys for the IA and the major producers to dismiss the \$43,000,000 damage suit filed by the Conference of Studio Unions, headed by Herbert Sorrell. Attorneys for the CSU immediately announced that they would appeal the ruling.

The CSU filed the suit in 1947, charging the IA and the major producers had conspired to lock out CSU workers in violation of the anti-trust laws.

- An unpleasant surprise greeted Frank Dowd, secretary of Kansas City Local No. 170, one morning recently when he discovered that the Local's offices had been broken into during the night and more than \$500 in cash taken from the safe.

- Harry Garfman, Brooklyn business representative for New York City Local No. 306, was tendered a testimonial dinner by the Movie Social Club of Kings County (Brooklyn). Although Harry is one of the younger members of the Local, he has proven himself a very able official and is popular with the membership.

- Projectionist Local No. 440, St. John, Canada, established a precedent last month by extending invitations to its annual dinner-dance to theater executives. The cordial relations existing between the labor-management groups were evidenced by the presence at the party of prominent exhibitor personalities.

- Allen G. Smith, New York City branch manager for National Theater Supply Co., is now on the mend from his latest bout with the surgeon's scalpel. Allen

has had more than his share of hospital beds during the past several years, and we hope that he has seen the last of them.

Despite pain and discomfort, Allen never lost his sense of humor, and when we visited him recently he regaled us with a hilarious explanation of the "Murphy Drip" treatment he received at the hospital.

- In line with its policy of past years, Pittsburgh Local No. 171 held its annual children's Christmas party on the 16th of this month. Bill Thompson, president, said this was one of the best kiddie parties ever given by the Local.

- We sympathize deeply with our good friend, Joe Pirka, secretary of Local No.

421, Herrin, Ill., on the recent death of his brother, Julius, also a member of the Local. The brothers were devoted to each other, and Julius' death was a severe blow to Joe.

- Charley Hahn, president of the McAuley Mfg. Co. (Peerless lamps), and Bill Gramer, representing the Chicago branch of National Theater Supply Co., paid a visit to New York several weeks ago to witness a demonstration of a new optical system. The demonstration, held at Radio City Music Hall, proved the claims of both Hahn and Gramer.

- The Hollywood AF of L Film Council is waging a stiff battle with major producers in an effort to gain a cost-of-living boost for its nearly 20,000 studio workers. The unions assert that an increase is warranted—in fact, long overdue—because while wage scales have remained static since 1947, the cost of living has skyrocketed. When contracts were signed last year between the West Coast film studios and the various IA Local Unions, the producers' representatives painted a grim picture of the industry's future economic outlook, predicting that all the

NOVEL FLOAT WINS FIRST PRIZE FOR LOCAL 504, SANTA ANA, CALIFORNIA



This prize-winning float, which was entered in the recent Halloween parade, held annually in Anaheim, Calif., was constructed by the members of Local 504 under the guidance of A. L. Hanson, the designer. The majority of the figures on the float were animated and were in motion as the float proceeded along the line of march.

PROJECTIONISTS LOCAL NO. 376

Syracuse, New York

extends Holiday Greetings

to all Locals in the IA.

major companies would be operating "in the red."

Not only were these predictions exaggerated, to say the least, but in a letter sent recently to the Motion Picture Producers Association, the Film Council stated "... the record will show that not only have the companies *not* been in the red, but the stockholders have over the past five years participated in the greatest dividend-earning period in the history of this industry."

• John H. Morgan, president of Kansas City Local No. 170, is mighty proud of his wife, Nellie, who recently was installed as Worthy Matron of Josepha Chapter No. 63, Order of the Eastern Star, succeeding Mary Jane Truman, sister of President Truman. John, of course, was installed as Patron.

• We received a very interesting letter from Lin F. Adams, member of Los Angeles Local No. 150, who has been working as projectionist in Saudi Arabia for the past year-and-a-half (IP for March, 1950, p. 22). Adams has just about had enough of the so-called "Oriental glamour" and is anxiously awaiting the day when he will be able to shake the sands of Arabia off his feet and set sail for these shores.

• Two IA amateur radio "hams" from Local No. 409, San Mateo, Calif.—Amos Kanaga, secretary, and John Turturici, business representative—scooped the various news services in broadcasting the recent attempted assassination of President Truman. Kanaga, who operates station W6BAA, was on the air taking traffic from the Army-Navy station in the Marshall Island group, and had just completed phone patch messages to points around the San Francisco bay area (a public service radio "hams" render gratis), when Turturici called him on the phone about some business pertaining to the Local.

Kanaga asked the station in the Marshall Island to stand by while he took the phone call. Turturici, meanwhile, tuned in his radio, and while waiting for Kanaga to answer his phone call he heard a radio commentator flash the news of the attempted assassination. He immediately relayed the flash to Kanaga, and after it was confirmed, the news was

sent out to all the radio stations in the Pacific and the Far East, giving these out-of-the-way places a scoop by at least several hours on the commercial and regular news services.

A combination of circumstances, plus quick thinking on the part of Kanaga and Turturici, made possible a news beat that many a veteran newspaperman dreams of but seldom experiences.

• Our congratulations to M. G. Miller, president of Local No. 521, Long Beach, Calif., on the success of his new business venture. Miller has entered the television field and now has 14 men on his payroll, and from all indications this number will be increased before long.

• Tom Shannon, charter member of Local No. 223, Providence, R. I., and its business representative back in the 1920's, died recently in Pawtucket, R. I. In addition to serving in various official capacities in the Local, Tom was president of the Rhode Island State Federation of Labor (AF of L), served as president of the Pawtucket Common Council, and was a member of the Motion Picture Operators' Licensing Board.

Tom had hundreds of friends through-

out the IA, all of whom, we are sure, remember him with affection and will regret deeply his passing.

• Death claimed two members of Denver Local No. 230 within a period of eight days. Henry F. Hekel, member of the Local since April, 1926, died suddenly on November 11 last; and Bernard (Barney) Fairbank, member since May, 1939, succumbed to a lingering illness on November 20.

Hekel was employed at the Denham Theater for the past 24 years, was a veteran of World War I and an active member of Lowry Post, V.F.W. No. 501. He was buried with military honors under the auspices of Paul Revere Lodge No. 162, AF & AM of Denver. Barney Fairbank worked as projectionist in various theaters in Denver, his most recent post being at the State Theater.

• California District Council No. 2 held its last quarterly meeting for 1950 on November 20 last in one of the private dining rooms of the "Stirrup Cup," a beautiful and popular restaurant in San Diego. (The Stirrup Cup, incidentally, is owned and operated by Bill Wise, president of the Council and business representative for San Diego Local No. 297.)

Carl Cooper, 7th IA vice-president, addressed the gathering, explaining many ramifications of the Taft-Hartley Law and the workings of the National Labor Relations Board. Several of the delegates reported that poor pictures were forcing some exhibitors in their jurisdictions to close theaters. This contention was bolstered by the fact that when a good picture is shown, box-office receipts take a sharp turn upward.

Greetings and Best Wishes

To All Local Unions In The Alliance

from the

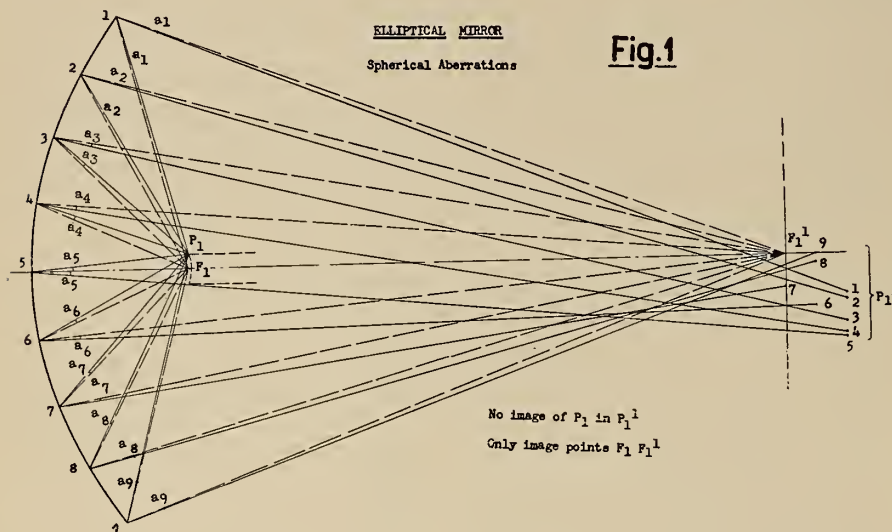
Officers and Members of
**MOTION PICTURE OPERATORS
LOCAL 306, NEW YORK CITY**



A Comparison of the Ventarc Mirror With the Elliptical Mirror

By DR. EDGAR GRETENER

The inventor of the Ventarc "blown" arc offers supplementary comment^{1,2} anent the optical system utilized by this radically different carbon arc.

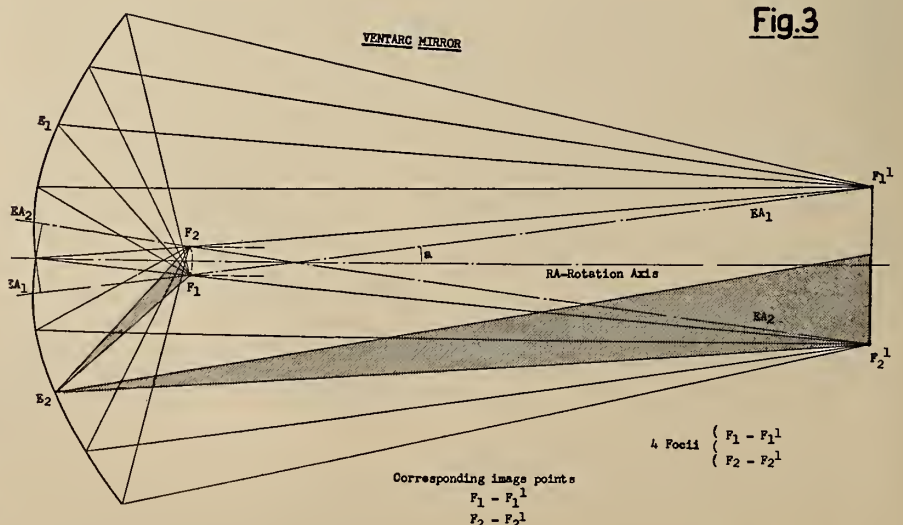
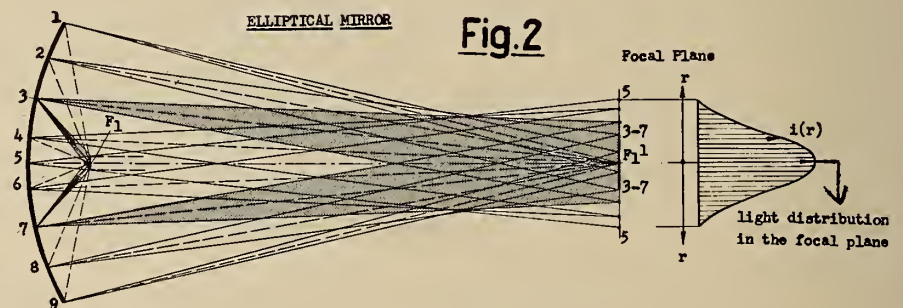


IT IS not useful to discuss the quality of the illumination systems in modern arc lamps by the theory of optical image distortions such as spherical aberrations, coma, astigmatism, and so on. Due to the very large collecting angle of the mirror (140°), the rays originating from an arbitrary point of the positive crater (out of center) are spread over a relatively wide area of the film aperture.

Besides the two focal points of an elliptical mirror, there are no corresponding image points in such a system.

Referring to Fig. 1, the rays emanating from focal point F_1 toward the points 1-9 of the mirror surface are recollected in focal point F_1^1 ; while the beam originating from P_1 at the edge of the positive crater is spread over the arc P_1^1 in the second focal plane, instead of being recollected in a corresponding picture point.

For building up the light distribution in the focal plane, or in any other plane normal to the optical axis, it is advisable to consider the elliptic light cones formed by every point of the mirror surface as apex, and the positive crater area as base. The light distribution in the second focal plane can be calculated



by the superposition of the illumination produced by all these cones for all the surface elements of the mirror.

Referring to Fig. 2, the axis of all these cones cross in the second focal plane F_1^1 , whereby a light distribution $i(r)$ is achieved, as illustrated at the right side of Fig. 2.

Elliptical Mirror Light Distribution

The elliptical mirror yields a poor distribution in the focal plane. It is therefore normally used *out of focus* for getting better screen homogeneity. It goes without saying that this results in light losses by overshooting the aperture and in reducing the screen lumens.

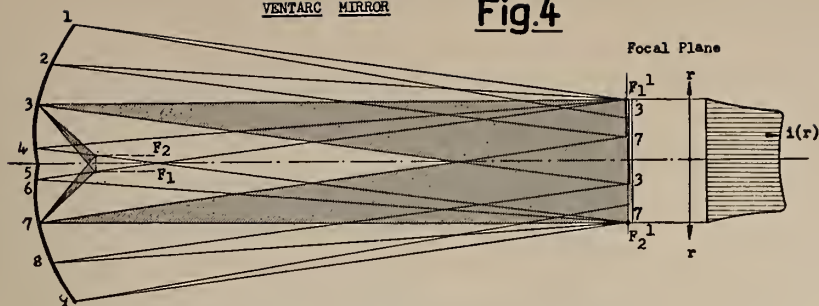
The Ventarc mirror shows 4 focal points in every meridional plane, as indicated by Fig. 3. This is achieved by rotating an ellipse arc E_1 around an axis RA , which is inclined by an angle a toward the ellipse axis EA_1 . The focal points F_1, F_1^1 of the ellipse arc E_1 are hereby to be located on the edge of the positive crater F_1 respectively on the edge of the film aperture F_1^1 .

Corresponding to Fig. 4, the illuminating cones are deflected towards the film aperture by the mirror surface in such a way that they touch all the edge of the film aperture. This results in a light

¹ "The Ventarc H.I. Carbon 'Blown' Arc: A New Concept": IP for July, 1950, p. 13.

² "Uniform Screen Light Distribution; Elliptical Reflector Mirror": IP for September, 1950, p. 13.

Fig.4



distribution in a focal plane as shown at the right side of Fig. 4.

The difference between a Ventarc mirror and an elliptical reflector becomes

evident by comparing Fig. 2 with Fig. 4. The Ventarc mirror produces the best effect if the film aperture coincides with the second focal plane.

Uniform Screen Light Distribution

IT WAS good of Dr. Gretener to reply to my comments anent screen light distribution. I do not find myself in agreement with Dr. Gretener, as I, too, have made tests and observations; moreover, I have given audiences 95% side-to-center light distribution over long periods of time, and I know definitely that I have obtained the most natural projection possible with the equipment I was using.

I might go so far as to say that the screen is as evenly illuminated as it looks to be, the only illusion being a possible apparent 5% increase in illumination at the edges.

Rounded Screen Corners

Also, I do not agree with Dr. Gretener that illumination levels in the corners of the picture are so important. In fact, I should prefer lower brightness in the extreme corners. The effect is about the same as that when rounded screen corners are used. The four points where screen edges meet must be made as inconspicuous as possible, and, of course, rounded corners eliminate these points altogether.

"Anti-Spherical Aberration"

Rounded screen corners are becoming increasingly popular, but they will not enjoy widespread use until the facts about them have been hammered into the heads of those exhibitors who seldom give such matters a passing thought.

Much that Sam Glauber said is true; but his remarks concerning the desirability of some spherical aberration in a mirror are incorrect. Spherical aberration produces a pronounced "hot spot" and spreads much of the illumination away from the focal image in such a way that it is impossible to obtain a well-defined spot. Much of the light is thereby wasted by being "fanned out" over the cooling plate.

* "Uniform Screen Light Distribution: Elliptical Reflector Mirrors"; IP for Sept., 1950, p. 13.

actually seen on the cooling plate to be a sharply defined disc instead of a fuzzy, power-wasting, hot-spot blur of light.

Anti-spherical aberration is introduced by exceeding the conic specifications for any given mirror design. Such mirrors are commonly termed "over-parabolized", even though they may not actually approach the parabolic curve. In fact, an ellipse of shortened major axis would be considered, for practical purposes, a parabolic form.

Although Dr. Gretener did not give specific information on the Ventarc mirror, it is an overparabolized mirror. It has been deliberately computed to give an 80% distribution of screen light when used with a light source having the brilliancy-distribution characteristics of the Ventarc positive. Additional parabolization would give even more uniform screen illumination; while excessive parabolization would make the picture actually brighter at the edges than at the center—a very undesirable condition.

ROBERT A. MITCHELL

Fraternal Greetings

TREASURERS AND TICKET SELLERS

LOCAL UNION NO. 751

I. A. T. S. E.

NEW YORK, N. Y.

Compliments of the Season

LOS ANGELES LOCAL NO. 150

I. A. T. S. E.

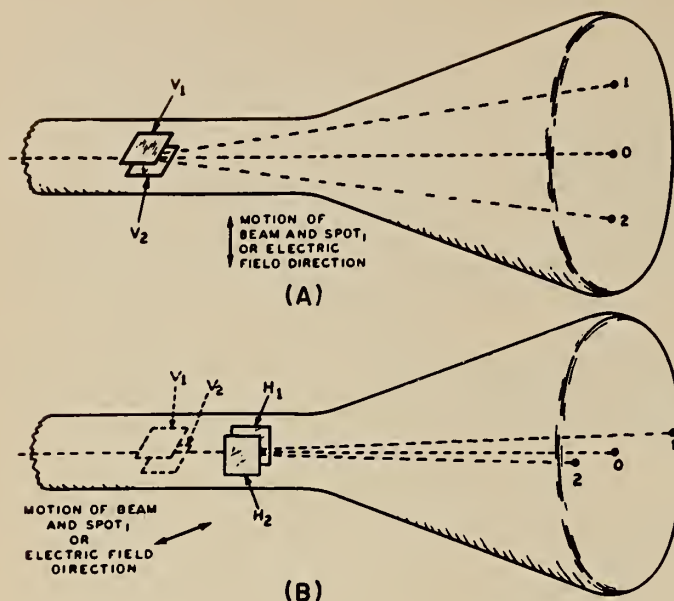


FIGURE 1
Deflection in the electrostatic tube (A) illustrates vertical deflection by plates V_1 and V_2 ; and (B) illustrates horizontal deflection by plates H_1 and H_2 .

diameter, the diameter of the beam when it strikes the screen. Wherever the screen is struck by the beam, a tiny dot of light appears. If this little dot of light is made to remove rapidly enough across the screen, a luminous line will appear. This leads to the statement that whatever trace or pattern or picture appears upon the face of a cathode-ray tube, it is made by a single dot which removes across the surface of the screen.

Deflecting the Electron Beam

To make proper use of the cathode-ray tube, the electron beam must be made to move across the surface of the screen. This is called "deflection." This displacement of the beam can be accomplished by either electrostatic or electromagnetic means, by placing the beam under the influence of the appropriate

The Cathode-Ray Tube: Basic Data

By JOHN F. RIDER and SEYMOUR D. USLAN

Although by no means a new device, the cathode-ray tube did not come fully into its own until World War II and thereafter, when the mushrooming television industry, and other electronic system advances, gained for it wide recognition of its capabilities. Originally appearing as one chapter in the massive work *Encyclopedia on Cathode-Ray Oscilloscopes and Their Uses*, these data are presented here by permission of John F. Rider, publisher of the book.

THE cathode-ray tube has become known to the public as the "picture tube" in a television receiver. Men from all walks of life who participated in the radar activities of the different branches of the Armed Forces are familiar with it. Peacetime applications of the "echo" principle of detection of unseen objects are widespread. Truly, it is a wonderful device which serves science, industry, and numerous other fields of activity as a means of disclosing action which formerly could only be guessed at.

What is this marvelous device which is capable of serving so many masters? On the surface, it may appear as a complicated device. In reality, it is not so—anyone with an elementary knowledge of electricity and magnetism can readily comprehend its action. In essence, it is a vacuum tube—a special type of tube in which a very narrow beam of electrons behaves like an electronic "pencil" and "draws" a visible trace or pattern on a specially prepared screen.

Parallels to Vacuum Tube

Compared with the ordinary variety of receiving or transmitting type of vacuum tube, the cathode-ray tube is singular

in many respects, but it will be noted, as its theory of operation unfolds, that there are many parallels between its principle of operation and that of the general-purpose vacuum tube; this statement is made in an effort to ward off any misconception that its understanding involves new theories and principles which are accessible only to the man with an engineering background. Such is not the case, even though the concepts of electron optics are relatively new ones to the individual whose work in electronics has been restricted to the ordinary vacuum tube.

The source of electrons is a hot cathode located in the base end of the tube inside the envelope (Fig. 1). An assembly of electrodes forms the narrow electron beam and accelerates the electrons toward the screen which is located furthest from the cathode, at the widest portion of the tube. The screen is a coating of luminescent material on the inside surface of the large, relatively flat end.

When the high-velocity electron beam strikes the screen material, it causes the atoms located at the point of the beam impact to luminesce. The result is a luminous dot about 0.005 to 0.05 inch in

field. This is the purpose of the deflection plates in the electrostatically-deflected tube and of the deflection coils in the electromagnetically-deflected tube. In both instances, the deflection system is located at appropriate points along the path of the beam. Fig. 1 illustrates deflection in the electrostatic tube.

The dotted lines in Fig. 1-A represent three paths of the electron beam. Without any deflection voltage applied across the vertical-deflection plates, the point 0 results. With deflection voltage of such polarity as to move the beam toward the upper limit of the tube screen, we get point 1. Then, deflecting the beam toward the lower limit of the tube screen, we get point 2.

Analogous conditions associated with the horizontal-deflection plates are indicated in Fig. 1-B. These plates are vertically oriented, and the three points of

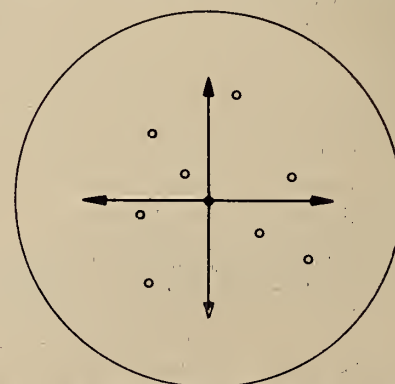


FIG. 2. Beam positioning: the center dot being the undeflected beam, and the small circles indicate positions of the beam under various steady-state deflection conditions.

Season's Greetings

To All Members of I. A. Locals

from

Moving Picture Operators Local No. 162

SAN FRANCISCO, CALIF.

impact of the beam are: 0 for no deflection, 1 for deflection toward the right, and 2 for deflection toward the left. The dotted rectangles within the tube envelope in Fig. 1B are the vertical-deflection plates.

Types of Deflections

Electrostatic deflection is the result of either the force of attraction between unlike charges in the electron beam and the positively-charged deflection plate, or the force of repulsion between like charges, between the negative charges in the electron beam and the negatively-charged deflection plate. When the deflection voltage is applied to the deflection plates, one becomes positively charged, naturally, and the other assumes a corresponding negative charge.

Electromagnetic deflection is the result of the interaction of magnetic fields—the field which surrounds the moving electrons which comprise the beam and the field developed by the deflection current in the coils.

A representation of the two perpendicular directions of deflection is given in Fig. 2. The heavy dot at the center is the location of the undeflected beam. Under ideal conditions, it is located at the geometric center of the tube. Since the two deflection forces may be applied simultaneously, the electron beam may be made to strike the screen at any point on its surface, the exact location being determined by the relative intensities and directions of the individual deflection fields. A few positions of the beam under various steady-state deflection conditions are indicated by the small circles between the crossed arrows.

Under any one set of operating conditions a linear relationship exists between the strength of the deflection force and the magnitude of deflection. Since the strength of the electrostatic field is proportional to the deflection voltage which causes it, and the strength of the electromagnetic field is proportional to the current which causes it, the movement of

the dot on the screen is directly related to the instantaneous changes in the deflection voltage or current, whichever is responsible for the deflection field.

Deflection Forces Action

An explanation of the reason for the two deflection forces acting on the elec-

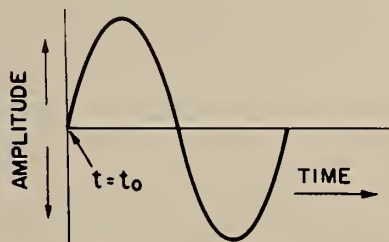


FIG. 3. One cycle of amplitude variation along time axis.

tron beam at right angles to each other might be in order here. All action takes

place in time. In order to show properly the manner in which an electrical quantity varies, it must be shown in relation to time. A 60-cps voltage completes a cycle of amplitude variation once every $1/60$ of a second. To portray a current or voltage waveform or any other quantity, varying or otherwise, the passage of time must be indicated on one axis of the figure.

By arranging a deflection which moves the beam at a constant rate in a horizontal direction, and by permitting the vertical deflection to correspond to the instantaneous variations in the amplitude of the waveform being investigated, the resultant motion of the beam will trace out a pattern which indicates instantaneous amplitude relative to time, as shown in Fig. 3.

The foregoing explanation should not be construed to set rigid boundaries around the use of the horizontal-deflection system. Numerous applications are possible in which the horizontal deflection does not indicate time. The one given here is fundamental to the display of waveforms in time, however, and should be accepted as such. Other applications use the horizontal deflection in a different way.

Path of the Electron Beam

The result of an abridged description of the deflection system might lead one to believe that changing the path of the electron beam by means of deflection fields will interfere with the beam's advance to the screen. This result is possible, but only when the deflection field intensities are excessive. Under normal con-

Cordial Season's Greetings

from

GENERAL PRECISION LABORATORY

INCORPORATED

Pleasantville

New York

Makers of Videofilm and
Direct Projection
Theatre Television Systems

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To the thousands of craftsmen who
have proven the superior quality of

LORRAINE CARBONS

ED LACHMAN, President

CARBONS, INC.

ditions of operation, the deflection fields simply change the path of the beam and do not interfere with its advance to the screen surface.

Concerning the movement of the beam across the screen, it can be made to follow any desired path. It can sweep across the screen once in a prescribed period of time at preset intervals, or it can be made to retrace its path as frequently and for as long as the operator may desire. It can do this slowly or very rapidly, although the appearance of the dot of light on the screen when the beam moves very slowly or rapidly calls for certain specific characteristics of the tube, especially the material used for the screen.

Frequency Response of Beam

By frequency response, in this case, we mean the ability of the beam to follow changes in the intensity of the deflection fields. All things being equal, the beam can respond to frequencies far beyond obtainable deflection frequencies. In order to utilize this response, it is necessary that special designs be employed inside the tube. Success has been achieved in this direction, but only to about 10,000 Mc. No doubt, in time, this range will be extended.

To explain these frequency limitations briefly: the higher the frequency of the deflection field, the faster is the movement of the electron beam across the tube screen. This reduces the period of excitation of the atoms of the screen material, and consequently, the resultant light intensity on the screen. As the frequency is increased, the light intensity decreases, until the trace becomes useless, or invisible.

To counteract this effect, greater accelerating potentials must be used. This increases the velocity of the beam, exciting the screen more strongly, and yielding greater light intensity. Greater accelerating potentials require, in turn, greater deflection voltages in order to deflect properly the faster-moving electrons.

Another factor is the finite velocity of the electrons which comprise the beam. These must pass through the deflection fields. If the polarity of these fields

changes too rapidly compared with the time required for the electrons to traverse the field and be acted upon by it, the net deflection will be reduced or distorted, or no deflection may take place at all.

Varied Density of the Beam and Spot Intensity

Before enumerating the many things the cathode-ray tube can do, it is impera-

tive to mention another fundamental form of control of the beam. Since the electron beam is formed within the tube, means exist for the control of its density. Assuming any arbitrary velocity given to the beam electrons, the electron density may be controlled over a wide range so that, if desired, the dot of light visible on the face of the tube may be changed from normal brightness to invisibility.

This is a very important control, for it is the means used to produce the picture seen on the television receiver screen. The deflection in the television picture tube is simply dot-positioning action, and the picture is the result of varying the light intensity from white to black at the different points on the screen. These light and dark points correspond to points in the scene being televised.

The foregoing is not the only use for such intensity modulation of the beam; there are many others which are associated with other applications.

As a matter of general interest, it is
(Continued on page 35)

★ Greetings and Best Wishes ★

PROJECTIONISTS LOCAL NO. 407
I. A. T. S. E. & M. P. M. O.

SAN ANTONIO

TEXAS

*May the joys that Christmas brings to you
be rich and lasting, deep and true.*



MOTION PICTURE PROJECTIONISTS

LOCAL UNION NO. 233

BUFFALO, N. Y.

JOHN J. WALSH

President

ALBERT F. RYDE

Business Representative

Projection Lens Miscellany

By KOLLMORGEN OPTICAL COMPANY

SHOULD SEALED LENSES BE TAKEN APART?

No, never disassemble a sealed lens. If there develops any indication that the lens need be taken apart, it should be returned to the factory for complete examination.

ARE SNAPLITE LENSES SEALED, AND IF SO, HOW?

All Snaplite Series II and Super-Snaplite lenses manufactured since January 1946 are of sealed construction to prevent entrance of moisture, dust or oil. This is accomplished by using a one-piece lens barrel made from a solid bar with no threaded joints. The front and the rear elements are sealed by means of synthetic rubber gaskets.

HOW IS IT POSSIBLE TO GET A BLURRED PICTURE WITH A GOOD LENS?

This is usually caused either by misalignment of the entire optical system of the projector or by the lens itself not being securely held.

WHY IS ALUMINUM USED FOR LENS MOUNTS?

Because of its light weight, high-strength aluminum alloy is preferred to brass for lens mounts, especially if the

former is protected by anodizing. A gold anodized finish is used for Super-Snaplites, while a black finish is used for the Series I and II lenses.

ARE PLASTIC MOUNTS USED IN SNAPLITE LENSES?

Definitely not. The black anodized aluminum barrel has sometimes been mistaken for plastic; but we do not consider plastics as being suitable for mounting high-precision lenses.

MUST FAST LENSES BE ALIGNED MORE ACCURATELY THAN SLOWER ONES?

Yes. An extremely fast lens must be held securely at all times. The lamp, projector and lens must be kept in alignment. Check by interchanging lenses between projectors.

SHOULD LENSES BE REPLACED IN HOLDERS IN THE SAME POSITION EVERY TIME?

This is not necessary in the case of Snaplites, which are so centered that no alignment marks are necessary.

HOW OFTEN SHOULD FOCUS BE CHECKED?

The focus should be checked at frequent intervals, especially after reels are changed. If after checking focus, align-

ment and lens holder, the lenses do not give a good picture, they should be returned for inspection.

HOW SHOULD COATED LENSES BE CLEANED?

Instructions on the care of both coated and uncoated lenses are generally available from either supply dealers or manufacturers. Form 66 is the Kollmorgen designation for these data.

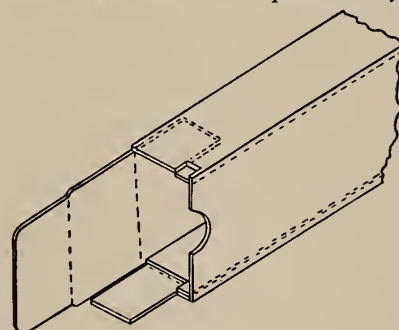
WHY DOES THE 5-INCH SIZE DIFFER IN SPEED FROM THE SHORTER FOCAL LENGTHS?

This is due to the limited space provided in some projectors. In other words, a 5-inch lens having a speed of F:1.9 would not fit into some present projectors because of the large diameter lens barrel required.

New National Carbon Container

A new container of unique design and construction has been developed by National Carbon for packaging projector and other types of lighting carbons. This new unit package adds materially to the convenience in handling and storing carbons and provides much greater protection of the contents than any previous container.

This new one-piece carton, shown here, has a self-locking device which requires no tape, staples or other method of sealing. When filled and closed the carbons will not spill out regardless of the manner or position in which the carton is held. The self-locking feature is obtained by cutting a channel in the inner side panels at the top of the container and folding the flaps on the outer side panels into this channel. These flaps are folded down into the inside of the carton and are held permanently in



New National carbon container

place by the carbons. The main closure flap is extra long and provides an adequate supporting element for the weight of the contents and thus prevents the carbons from forcing the carton open when held in a vertical position with the top downward.

When opened, the carton does not fall apart but is kept intact as a box by the self-locking device. This permits the carbons to be removed from the carton as needed and facilitates the storing of the remaining carbons.

Greetings and Best Wishes

**MOVING PICTURE PROJECTIONISTS
LOCAL NO. 223, I. A. T. S. E.
PROVIDENCE, R. I.**

Greetings and Best Wishes

for a

Happy Holiday Season

MOVING PICTURE PROJECTIONISTS

LOCAL NO. 337, I. A. T. S. E.

UTICA, N. Y.

SMPTE Engineering Committees Report

By F. T. BOWDITCH, *Engineering Vice President*

THE SMPTE *Journal* lists 19 engineering committees with a total of 313 members. More than 40 separate projects are presently under review by these groups; some have one project each, others as many as 10, thus it is obviously impractical here to review all this activity in any detail. Instead, this report will be confined to a few highlights which indicate current trends.

One trend is the considerable increase in the number of committee meetings being held, in large part the result of excellent coordination and secretarial activities of our Staff Engineer. Ten such meetings are scheduled during the five days of this Convention,* which is, as far as I am aware, a new high in this form of activity. Much of this is engineering survey work, such as that of the Screen Brightness Committee in its investigation of 100 typical theaters from coast to coast, the excellent work of the Color Sensitometry Subcommittee, the High-Speed Photography Survey, the study of air conditioning by the Theater Engineering Committee, and many others equal in importance to these few examples.

Vital Standardization Work

Also of major interest is the committee work in the field of standardization, where — to name only a few — typical projects now include the preparation of a new film leader suited to both television studio and motion picture theater projection, a method of calibrating and marking camera lenses in terms of light transmission, the specification of a standard base for a new projection lamp, the dimensional characteristics of magnetic sound tracks, and the continued work in the field of cutting and perforating motion picture film.

We have yet to find a satisfactory answer to the basic problem of when to standardize. An excellent time would be early in a new art, before machines and methods in different companies become fixed in conflicting fashion; but basic information is meager then.

Unfortunately, too, the need to standardize is not usually anticipated until actual conflict arises, and the resolution of the differences cannot help but cause economic loss to someone. Standardization becomes extremely difficult in such a case, although it is a pleasure to report increasing evidence of cooperative give-and-take in these matters. The extremely important function of the Society in providing a neutral meeting

ground cannot be underestimated, and everything possible is being done to maintain this impartial atmosphere.

New Committees Activated

Present trends are also represented by the new engineering committees formed this year. One of these is the Optics Committee, which is presently concerned with lens calibration standards and the dimensional properties of projection lenses. Our newest engineering committee is the Test Film Quality Committee, charged with the responsibility of maintaining high production standards.

Finally, the increasing importance of the engineering work of the Society in

the television field has been recognized by a realignment and expansion of our committee organization there. The Theater Television Committee of course continues, and to this have been added new ones: Television Studio Lighting, Films for Television, and, jointly with RTMA, Television Film Equipment.

RCA Theater Tv Sets Now in 9 Theaters Coast-to-Coast

Theater Tv loomed as a new industry with the recent announcement by RCA that it is immediately placing sales of its new commercial model PT-100 direct-projection theater Tv system in the hands of independent RCA theater supply dealers in all of the nation's Tv areas. The announcement was coupled with the disclosure that RCA has already shipped complete PT-100 installations to eight

Greetings from

LOCAL NO. 171

I. A. T. S. E.

PITTSBURGH

PENNA.

Season's Greeting

from

LOCAL NO. 328

Pine Bluff, Ark.

Holiday Greetings and Best Wishes

PROJECTIONISTS LOCAL NO. 279

HOUSTON, TEXAS

"Our beautiful new clubrooms are open to all IA members"



Greetings and Best Wishes

PROJECTIONISTS LOCAL NO. 160

CLEVELAND, OHIO



* SMPTE Convention at Lake Placid, N. Y., October, 1950.

motion picture theaters from California to Long Island.

Chicago's Tivoli Theater, owned by United Paramount, is the site of one of the eight new installations. The others are the Century Circuit's Marine, in Brooklyn, and the Queens, in Queens Village, L. I.; RKO's Fordham, in the Bronx; Fabian's Palace in Albany, Comerford's Capitol, in Binghamton, N. Y., and Fay's, in Providence, R.I.; and the Orpheum, in Los Angeles. Most of these have already been installed and additional units are in production.

RCA has already trained engineers in the installation and servicing of the equip-

ment and has begun courses of instruction for motion picture projectionists in cooperation with the IA.

Programming for theater Tv, RCA predicted, will develop through three general phases: first, the showing of regular off-the-air broadcast programs, such as the Notre Dame football games for which several theaters have already entered into agreements; second, the exclusive showing of special events, under arrangements such as those concluded by United Paramount with the "Big 10" colleges for their games, and finally, the signing or production of major attractions for exclusive showing in large numbers of theaters simultaneously.

Projectionist Examination Questions

Based on Examinations by Leading U. S. Municipalities

1. Of the following conditions, the one that would *not* cause "hum" is: (a) frame of the projector not properly grounded; (b) incorrect film tension; (c) motor or wiring not properly grounded, or (d) A.C. conductors too close to speech units.

2. A probable reason for the film image jumping on the screen is: (a) variation in the speed of the synchronous motor; (b) improper light focus; (c) dirt on the intermittent sprocket, or (d) chromatic aberration.

3. If the photocell is out of alignment with the slit leading to the film compartment, the result will probably be: (a) extraneous noises will be heard; (b) distortion will occur; (c) volume will increase, or (d) volume will decrease.

4. The number of frames of film contained in the identification leader or part title of a standard release print of 2000-foot length is: (a) 18; (b) 20; (c) 22, or (d) 24.

5. The resistance in ohms of a circular mil foot of copper wire is: (a) 5.4; (b) 19.8; (c) 15.0, or (d) 21.5.

6. The highest permissible number of amperes which a No. 6 rubber-covered conductor may carry is: (a) 40; (b) 50; (c) 60, or (d) 70.

7. You have a single-phase transformer which may be considered to be 100% efficient. The primary voltage is 2000 and the current is 20 amperes. The secondary voltage is 220. The secondary current, in amperes, is: (a) 20; (b) 181.8 (c) 200, or (d) 1818.

8. If you take 15 amperes from a 220-volt D. C. circuit, the number of kilowatts you will be using is: (a) 0.33; (b) 3.3; (c) 33, or (d) 330.

9. If three 3-ohm rheostats are connected in *series*, the number of ohms resistance offered will be: (a) 1; (b) 3; (c) 6, or (d) 9.

10. The "decibel" is a convenient unit for the measurement of: (a) electrical or acoustic power ratios; (b) electrical power only; (c) acoustic power only, or (d) volts and amperes.

11. A transformer on a 110-volt line takes 20 amperes on the primary side. With the arc voltage being 20, what is the amperage in the secondary?

12. Define a "rheostat."

Color Film, Equipment Shortage Bar to Early Color Tv

Shortage of color films and unavailability of broadcasting equipment for color films will make it difficult, if not impossible, initially, for Tv stations independent of the networks to operate under the recently adopted CBS mechanical color system, Dr. Thomas T. Goldsmith, Jr., Director of Research for the Allan B. Dumont Laboratories, told the SMPTE convention.

Present-day Tv stations, and particularly those operating independently of the big networks, Dr. Goldsmith de-

clared, rely heavily on motion picture films for their programs. They will, he pointed out, find it virtually impossible to obtain color films suitable for this purpose, if and when they begin transmitting programs in color, because of the shortage of color films. Only 15% of the entire supply of film is in color, he added, pointing out that even black-and-white films are in short supply.

Moreover, he added, equipment for recording Tv programs on film is even in more short supply than color film from Hollywood, and no equipment is at present available which would permit Tv stations to transmit color film even if such were readily available. Equipment capable of handling standard 24-frame-per-second film in such a manner as to produce satisfactory pictures under the so-called color-Tv "bracket standards" may not, according to Dr. Goldsmith, be available until long after live-program problems are solved.

START WORK ON NEW PLANT FOR KOLLMORGEN OPTICAL IN NORTHAMPTON, MASS.



Construction work was started on Nov. 20 for the new plant for Kollmorgen optical products, including Snoplite and Super Snoplite projection lenses. This new addition to the rapidly growing Kollmorgen facilities will have 45,000 square feet on one floor, arranged for maximum manufacturing convenience. Occupancy is scheduled for late next spring.

NOW!
f/1.9
EVEN IN 7 INCH
FOCAL LENGTH!

for the
LATEST PROJECTORS!

The newest projectors can take larger lenses. Here is the lens designed specifically to achieve top performance with these modern projectors—the sensational *four inch diameter Super Snaplite*. Speed of *f/1.9* from 5 through 7 inch focal lengths, in $\frac{1}{4}$ inch steps.

MORE LIGHT...the four inch diameter Super Snaplite gives you an *f/1.9* lens in focal lengths as long as 7 inches!

LONG LIFE...one piece mount, specially sealed lens elements, anodized finish that can't flake off—all spell longer, top-notch performance for the four inch diameter Super Snaplite!

Four inch diameter Super Snaplites are available, to order, in focal lengths from five up through seven inches, in quarter inch steps. In all these focal lengths the true effective speed of *f/1.9* is maintained. Four inch diameter Super Snaplites are also available, to special order, in focal lengths longer than seven inches, at somewhat slower speeds.



Get the full facts of this superlative new lens now—write for your copy of Bulletin No. 209 today!

*"You Get the Most Uniform Light
 with Super Snaplite"*

KOLLMORGEN
 2 Franklin Avenue
 Brooklyn 11, New York

Optical **CORPORATION**



Metro-Lite 65-85 Amps. Spot Offered by Genarco

A new spotlight designed especially for the lighting of stage shows in large theaters and auditoria is now ready for distribution. Known as the Metro-Lite "Vaudeville," this spot pulls 65 to 85 amps D. C. and will operate from the same power source—rectifier or generator—now used for film projection.

This Metro-Lite spot has a throw range of from 75 to 250 feet. It burns 9-mm x 20 high-intensity positive and a 5/16-inch negative carbons. The positive carbon is automatically rotated and is fed by feed rollers. The negative carbon is controlled by a ratio feed off a step-clutch. A hand feed is provided for emergency use.

The wheels and lighting effect levers are conveniently located on the left side of the lamp. A single wheel automatically focuses the spot, opens the inside iris, and controls the size of the spot. The delicately balanced



The Metro-Lite 'Vaudeville' spotlight, pulling 60-85 amperes D.C. and burning 9-mm x 20 H-I positive carbon.

lamphouse permits one-hand control and easy following of the fastest action. The wide tilting angle permits projection from the pit to an aerial act. The housing is balanced with springs and will lock in any position.

4-Element Optics, Wide Range

A modern four-element optical system enables a range of "throw" from 75 to 250 feet. This system enables a gradual extension of spot diameter: for example, at a 100-foot throw the range is from a small 18-inch spot up to one 30 feet wide. The 6-inch fading iris gives a gradual dimming of the light from total brightness to total darkness. A square shutter permits projection of rectangular shapes. A box of six color frames and an ultra-violet frame for "black light" effects is provided. Cooling of the gelatin is accomplished by a powerful blower motor.

Performance quality of this spotlight is reflected by the following figures resulting from actual tests: at 85 amps, 60 volts D.C. and at a throw of 100 feet the smallest spot is 18 inches in diameter and the brightness

of the spot is 550 foot-candles. The largest flood is 30 feet wide and the average brightness is 45 foot-candles.

The Metro-Lite "Vaudeville" spot is manufactured by Genarco, Inc., at 36-56 34th St., Long Island City 6, New York.

More Films For Video?

Independent producers of low-budget films are being forced out of business and must find added revenue from the television market if they are to survive. I. E. Chadwick, chief of the Independent Motion Picture Producers Association, stated recently. Chadwick cited the fact that members of his organization, which includes independents operating in the lowest economic bracket, have made only 40 pictures in 1950, whereas in 1949, their poorest previous year, they made 90.

He said that he had advised members of the association that their most important concern must be to find a way to sell their pictures to television "shortly after their exhibition in theaters." Competition from Tv, he added, has hurt the low-budget producers far more than the majors, because bookings of cheap films are in marginal theaters—"the first to close when the boxoffice falls off."

The association is negotiating with the AF of M to find a means of clearing the musical scores of their pictures for video use—the scores now being unavailable for Tv transmission because of a contract with the union.

New Brenkert Plant Designation

The Brenkert Light Projection Co. plant in Detroit will be operated hereafter as the Brenkert plant of the RCA Victor Division, Radio Corporation of America. The Brenkert company has been a wholly-owned subsidiary of RCA Victor since 1945. The change is effective immediately.

The manufacture of RCA motion picture projectors and arc lamps will be continued at the Brenkert plant, and these products will continue to be distributed by the RCA Theater Equipment Section through independent RCA theater supply dealers.

Karl and Wayne Brenkert have been retained by RCA as consultants for the Detroit operations, having submitted their resignations as president and vice-president, respectively.

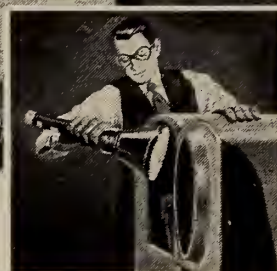
Jim Frank to U. S. NPA

James Frank, Jr., was named to head the Motion Picture Equipment Section of the National Production Authority. Mr. Frank was formerly associated with RCA Photophone International Projector Corp., and National Theatre Supply. For many years he has been active in the SMPTE, having served at one time as Financial Vice-President.

THEATRE TELEVISION



**We install it—
we service it**



RCA Service Engineers on television assignments are factory-trained experts. You can depend on them to keep your theatre TV equipment at peak efficiency.

When you get set for television in your theatre, RCA Service Engineers are prepared to help you.

These experts have received intensive training in the television laboratories and factories of the Radio Corporation of America and are qualified to supervise the installation of complete theatre TV systems—and keep them running.

They will see to it that all video equipment, including coaxial lines and antennas, are installed for maximum operating efficiency. They will give whatever operating instructions are necessary to your projectionists on handling the equipment. They

will be on ready call for quick emergency service.

Like the Service Plan for motion picture equipment, RCA's new Theatre TV Service includes periodic inspection calls and unlimited emergency service—at reasonable rates. Tubes and components are replaced without additional charge when Parts Plan is included.

IMAGINE IT—television programs on your screen with reliability corresponding to a motion picture show. It's a fact—when it's backed by RCA Service. Write for complete information.



RCA SERVICE COMPANY, INC.

**A RADIO CORPORATION of AMERICA SUBSIDIARY
CAMDEN, NEW JERSEY**

★ Season's Greetings ★

**LOCAL NO. 76, I. A. T. S. E.
SAN ANTONIO, TEXAS**

Revised Release Print Leader

The following communication from the SMPTE anent release print leaders (IP for Sept., 1950, p. 25) should interest projectionists:

"In July, we prematurely announced the availability of a newly proposed release print leader. Contrary to expectations, the first prints were found unsatisfactory after trial at a few of the New York television stations; consequently, another version was made up and prints were distributed to all of the Tv networks in New York. On September 8, Charles Townsend's subcommittee met and approved this version for limited trial distribution.

"After consultation . . . it was agreed to make up a fairly substantial quantity of both negatives and prints. All of those requesting samples as a result of the July announcement, as well as others known to

Merry Christmas and
a Happy New Year
from Members of
LOCAL NO. 548
Paris, Texas

have an interest in this project, have now been supplied.

Should Serve All Fields

"There has been some concern among those responsible for this work that rather general distribution at this time may cause difficulties. It has been the hope from the start that one leader can be developed

Holiday Greetings
LOCAL NO. 396
I. A. T. S. E.
Binghamton New York

which will serve the theater, Tv and the 16-mm fields equally as well. If the trial leaders now being distributed should get into general use, it would certainly mean the existence of two leaders and the possibility of considerable confusion; therefore, a letter was sent with each sample, requesting the recipients to use the leaders only for experimental purposes and to withhold any wider use until the committee has had an opportunity to review all comments."

ONLY Century PROJECTORS HAVE EVERYTHING



CENTURY'S high-efficiency projector with the NEW 4-inch diam. lens provides pictures of increased brightness and appeal—for even the largest drive-in screens.

CENTURY'S water-cooled aperture gives as much light with a 90 ampere arc as other projectors using a 180 ampere arc and heat filters!—Reduce power cost—Get sharper pictures—Save film.

CENTURY'S sealed, oil-less bearings and glass-hard gears reduce maintenance costs. No oil sprays or baths to mess up film or projection room.

You can SEE and HEAR the difference!

CENTURY PROJECTION AND SOUND SYSTEMS
See your dealer or write for information

CENTURY PROJECTOR CORPORATION
New York, N. Y.

Altec Service For Videofilm

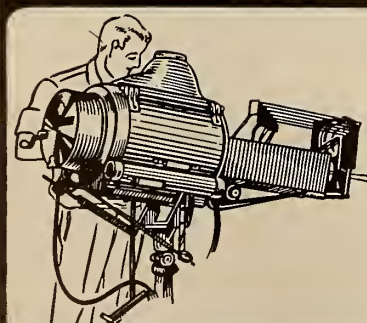
Servicing of the new General Precision Laboratory "Videofilm" theater television system (IP for Nov., p. 15) will be handled by Altec Service Corp., according to Walter Green, president of National Theater Supply Co., which will distribute the equipment. Videofilm has aroused much interest in exhibitor circles following its successful demonstrations at the TESMA show in Chicago, at the TOA meeting in Houston, and before the SMPTE at Lake Placid, N. Y.

Altec is very well known to exhibitors through their many years of service of theater sound systems. Not the least of their qualifications is the fact that they offer a nation-wide service which will assure exhibitors in all territories the immediate attention of the Altec man whenever necessary. The new GPL Videofilm system will be distributed through National Theatre Supply's 29 branch offices in principal cities from coast to coast.

Du Pont Film Executive Changes

James S. Denham, general manager of Du Pont's Photo Products Dept., retired on Dec. 1 after 35 years of service. He was succeeded by Samuel G. Baker, who formerly was manager of the Electrochemical Dept.

"World's Most Powerful Spotlight"



The METRO-LITE high-intensity carbon arc spotlight comes in two models:—

- ★ MODEL ME 4 125 Amps D.C. 100 ft. to 400 ft. throw.
- ★ MODEL ME 5 "Vaudeville" 60 to 85 Amps D.C. 75 ft. to 250 ft. throw.

METRO-LITE

Literature available on both units upon request to
GENARCO, Inc. 36-56 b 34th St., Long Island City 6, N. Y.

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The operators' favorite . . . silent and safe! U. L. approved. Eliminates fire hazard. Positive friction . . . can't clinch film. Tilt-back case . . . reels can't fly off. Microswitch safety cut off . . . when door opens or film breaks, motor stops.

★ At better theatre supply dealers.

GOLDE MANUFACTURING CO.
1222-P W Madison St. Chicago 7, Ill.

THE CATHODE-RAY TUBE : BASIC DATA

(Continued from page 28)

possible to classify the uses of the cathode-ray tube into three major groups. These are:

1. Cathode-ray tubes used as display devices in receiving systems.
2. Cathode-ray tubes used as generators.
3. Cathode-ray tubes used in measuring equipment.

Cathode-Ray Tube in Receivers

An appreciation of the first use is easy. Millions of television receivers employ the cathode-ray tube either as the viewing screen on which the picture appears, or as the source of the picture which is enlarged for projection onto a separate viewing screen.

Another example is the radar receiver. A pulse is sent out into space from a transmitter. One or more target objects reflect some of this electromagnetic energy, and the reflections are picked up by a receiver adjacent to the transmitter. The reflected signal appears on the calibrated screen of a cathode-ray tube, and specific information concerning the location of the reflecting target, relative to the receiver, is determined from the trace on the cathode-ray-tube screen.

A type of radar equipment which is enjoying expanding peacetime application is the device which develops a map of the land or sea area being scanned by the equipment. In this system, a short-duration pulse is repeatedly transmitted from an antenna which is located above the area being examined. The antenna rotates azimuthally several times per minute, scanning the given area by small sectors. A reflected signal returns from each small sector, and, after the usual handling by the receiving equipment, appears as a spot, or a series of spots, of light on the screen of the cathode-ray tube.

The net result is a map of the area scanned. A display device of this kind used for Armed Forces or civilian pursuits is called a PPI, or Plan Position Indicator.

Another important use of the cathode-ray tube is in the panoramic receiver also known as a Panalyzer, or Panadapter, which has been used by amateurs for many years. During the war, it proved to be a very valuable piece of communications equipment.

The Tube as a Generator

The second category of uses mentioned above is not as clearly defined as the first. The equipment as a rule is still experimental in nature. Tubes other than those using luminescent screens, although

properly classified as cathode-ray devices, are used as generators of electrical energy of various kinds and have become commercial realities.

These devices utilize the electron beam for purposes other than to make a screen fluoresce. The beam may be rotated by suitable means and in that way be made to complete alternately electrical circuits with a series of stationary metallic seg-

ments, which, in turn, may control other circuits. The beam now acts as an electronic commutator. Because it is almost inertialess, the frequency of commutation can far exceed that of any conceivable mechanical device.

In another use, the beam may excite a resonant cavity, thus producing extremely high frequency oscillations, as in a manner not unlike the magnetron. There are

ANSWER TO YOUR TECHNICAL PROBLEMS...



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*The Altec
Service Man and
the organization
behind him*

PROTECTING THE THEATRE—FIRST PLACE IN ENTERTAINMENT

NEVER HAS
Economy
BEEN SO
ESSENTIAL AS NOW!

THERE IS A LORRAINE CARBON TAILORED FOR
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Send necessary projection equipment
data to guide us in recommending the
Lorraine Carbons that will do your
theatre or drive-in projection job better
and More Economically.

SLOW BURNING
SAVINGS IN POWER CONSUMPTION
SAVINGS IN MAINTENANCE

ECONOMIZE

WITH *Lorraine
Carbons*

Lorraine CARBONS, INC., BOONTON, N. J.

applications indicated by patent disclosures listed in the bibliography.

Measuring and Testing Equipment

This is the third and most important group of uses, and it is of primary interest to us since its use in the cathode-ray oscilloscope is included. In this capacity, it performs two major roles. The foremost is its function as the display element. Information made available by the unit appears on the screen of the tube. The interpretation of this information in-

volves the proper correlation of the trace with the settings of the auxiliary apparatus, which, together with the tube, comprises the oscilloscope.

Sometimes the complete device is housed in one metal cabinet. At other times, accessory apparatus is used with it, and the complete system then consists of several individual units. Even then, the cathode-ray oscilloscope is a complete individual assembly.

The second major role of the tube is

related to its practical purpose. Its purpose is to portray one voltage as a function of another. In general, where the cathode-ray tube is used for instrumentation purposes, electrostatic-deflection

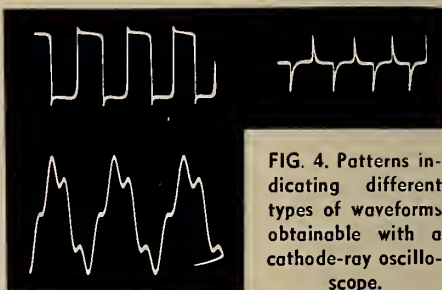


FIG. 4. Patterns indicating different types of waveforms obtainable with a cathode-ray oscilloscope.

LOOK TO WENZEL

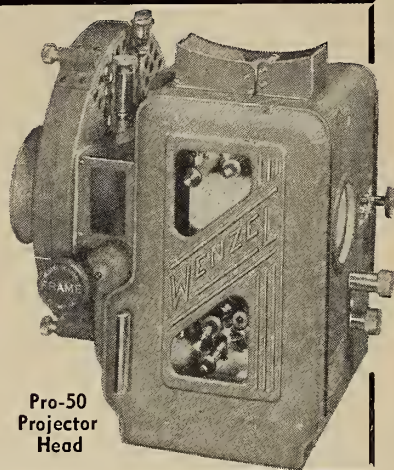
for the Finest in Projector Equipment



Closed Sound Head

WENZEL PROJECTOR CO.
2050-19 S. State St. Chicago 16, Ill.

Pro-50
Projector
Head



methods will be used. This is so because only electrostatic-deflection methods are sufficiently versatile to perform the variety of functions, and reproduce the great variety of waveforms the oscilloscope is called upon to reproduce.

Electromagnetic deflection is usually used where the conditions of operation are fixed, as, for example, in television receivers and radar receivers.

Examples of patterns representative of the diversified applications of the cathode-ray oscilloscope appear in Fig. 4. All of these picture electrical phenomena. This deals with fundamental electrical measurements rather than non-electrical applications.

**29
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COAST TO COAST**

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THEATRE SUPPLY**
Division of National • Simplex • Blumhardt, Inc.

YOU CAN "RELY" ON NATIONAL

EFFICIENT • DEPENDABLE RECTIFIERS for Every Type Projection Lamp



**2-Tube
4-Tube
6-Tube**
Single and
Three Phase
Models for

- Rotating Feed
Angular Trim
High Intensity
- Copper Coated Coaxial
High Intensity

- 1 K.W. High Intensity
- Low Intensity

Smooth Output Current • Long Life
Low Operating Temperature
Flexibility in Control

Write today for literature or
free demonstration.

**THE STRONG
ELECTRIC CORP.**

**31 CITY PARK AVENUE
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**PROJECTION LAMPS • RECTIFIERS
SPOTLIGHTS • REFLECTORS**

NEWS PROJECTIONS

FEDERAL Court in New York has extended time for both Warner Bros. and 20th Century-Fox to file final plans for divorcement of their exhibition interests from production. Warners now has until Jan. 15, and Fox until March 5, both 1951. . . . Eastman Kodak reported net earnings of \$43,134,237 for the first three quarters of this year, an increase of \$9 millions over same period last year. . . . Allen B. DuMont Labs reports profits up 199% to \$5,018,000, over same period of 40 weeks last year. Sales rose 77%. . . . Reaction to the Army-Navy football game telecast at six large-screen theaters in the East ranged from "excellent" to "fair," with management in every case citing a distinct improvement over usual week-end biz. . . . Technicolor will turn out 60 features during 1951, an increase of 33 1/3% over this year. . . . Detroit exhibitors approve of theater Tv, but they warn against the general tendency to over-price the shows. . . . RKO's net profit for the 39 weeks ending Sept. 30 was \$608,632, which figure includes a net profit of \$216,185 on the sale of capital assets.

* * *

The long-delayed test of Phonevision, pay-as-you-see Tv system sponsored by

Zenith Radio, is now underway in the Chicago area. Break came when major distributors, prodded by the Dept. of Justice, which displayed keen interest in the conspiracy angle of denying product, agreed to furnish pic for the trials. Zenith system utilizes 'phone lines for transmittal, with an "unscrambler" on the receiving end—for a fee, of course. . . .

Eight major film companies are disclosed to have a total of only 150,000 stockholders, a figure well below that heretofore accepted by the industry. Fox-20th tops the list with 33,000. . . . New RKO Theaters Corp., following reorganization after divorcement of production from exhibition, is expected to operate 97 theaters in the U.S., of which 85 will be wholly owned. . . . Representatives of 12 newspaper-owned Tv stations have decided to poll their resources and produce motion pictures for their exclusive home-town use, with syndication to papers in other areas. . . . There will be no censorship of Tv films in N. Y. State. . . . Value of emergency standby power supply was demonstrated in past month, when a series of storms occasioned shutdowns and refunding of admission fees.

* * *

American labor circles decry production of feature films in foreign lands just for the sake of unfreezing distributor capital in those countries. . . . Loew's has joined Warners and RKO in boosting downtown first-run theater prices by five cents. No patron opposition is reported. Next advances are slated for subsequent-run stands. . . . Legion of Decency, review board for Catholic Church, in the past year found 53% of foreign films "objectionable in whole or in part," while American flickers rated 20% in the same category. . . . RCA's latest demonstration of its color Tv system was credited with the following eight improvements: Improved color fidelity, improved picture texture, simpler circuits in receivers, picture brightness increased, an increase of



Season's Greetings

LOCAL NO. 373

I. A. T. S. E.

TERRE HAUTE, IND.

Greetings from
**FILM EXCHANGE
 EMPLOYEES' UNION**
LOCAL B 45, CHICAGO, ILLINOIS

SAMUEL LAMASKY,
Business Manager

BESSIE GILBRETH,
President

FRANK LINGENFELSER,
Secretary-Treasurer

color dots on the face of the tri-color tube from 351,000 to about 600,000, higher definition, new red and blue phosphors in the tri-color tube adding picture brightness and eliminating the optical filter, and improved color operation in the transmitting studio, resulting from refined circuitry.

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LETTERS TO THE EDITOR

Release Print Riddles

THE appended communications are self-explanatory; but they bear upon only a small fraction of the total number of weird happenings in the handling of motion picture prints, negative and release, extending from Hollywood down through the processing stage, into the exchanges and finally to the theater projection room—where, of course, Mr. Projectionist takes the beating effortwise and verbally from uninformed managerial personnel.

IP would welcome many more reports from the field as to the condition of release prints along the following line:

To the Editor of IP:

Can you enlighten me upon the following? Should the words "Safety Film" be *black* letters on a *clear* background to conform to accepted practice? If these words are in *white* letters on a *black* background, does this mean that the negative from which the print was made was safety stock?

Also, I have reason to believe that some prints now in circulation have had their leaders replaced with safety film. Cute?

Recently we had trouble with a newsreel print, examination of which disclosed that it had incorrectly punched sprocket holes, like this: 000000000000, etc. We had to eliminate 73 feet because of loss of continuity. Of course, the blame was directed at you know who.

SYDNEY T. CLARKE, Secretary, IA
Local 223, Providence, R. I.

The foregoing was referred by IP to an authoritative source, eliciting the following response:

To the Editor of IP:

In answer to the questions posed by your correspondent, we would say that the marking put on raw stock should read "Safety Film" in *black* letters on a *clear* background. As we have discussed with you previously, however, this would not always be a sure thing, since on rare occasions the wording from an original can be carried through the duplicating process. It is certain, however, that if the letters are *white*, they have been printed through from an original.

As to the question of safety leaders, we

have always held this to be a dubious practice because of the danger of someone replacing a leader with the wrong one.

Anent the incorrect sprocket holes, it is difficult to understand how holes of the type described could occur. If your projectionist correspondent has a sample of this film, we would certainly appreciate having it for examination.

ROBERT M. CORBIN, Motion Picture
Film Dept., Eastman Kodak Co.

Carbon-Tet Poisoning?

To the Editor of IP:

I am very grateful for the exchange of views between us on the danger inherent in the use of carbon tetrachloride. Recalling the placidity with which most readers of IP accepted previous warnings anent carbon-tet, I think it would be a distinct service to the craft if you would reprint in full the medical report which you forwarded to me.

ED.'s NOTE: The report referred to is appended hereto in full:

POISONING WITH CARBON TETRACHLORIDE: DIAGNOSIS OFTEN OVERLOOKED.

In view of the tendency to overlook poisoning with carbon tetrachloride in conditions diagnosed as uremia due to nephrosis or nephrosclerosis, the authors call attention to the increasing number of non-industrial cases of carbon tetrachloride poisoning being treated in hospitals.

Of 12 cases of carbon tetrachloride nephrosis in 5,000 admissions during two years at the U. S. Marine Hospital, Staten Island, N. Y., five proved fatal. Only one case was industrial. Seven of the patients had used CCl₄ to clean their clothes and did not become ill ("gastroenteritis") until 12 hours afterward. One patient cleaned upholstery in his car, one slept near a carbon tetrachloride fire extinguisher, and one used the fluid to thin paint.

Treatment is aimed at keeping the patient alive until acute renal failure subsides. Fluid intake is limited to 800 cc. of salt-free fluid per day. If excretion does not start and blood nitrogen and creatinine levels rise, transperitoneal irrigation of the artificial kidney are used, with an irrigating fluid containing 0.6% of sodium chloride.—R. M. FARRIER AND R. H. SMITH, *J. Amer. Med. Assn.*, vol. 143, pages 965-967, July, 1950.

Carbon tet is used in a great many projection rooms for general cleaning and

Season's Greetings

Projectionists Local No. 173

I. A. T. S. E.

TORONTO, ONT.

CANADA

Merry Christmas
and
A Happy New Year
**PROJECTIONIST
LOCAL NO. 314**

Schenectady New York

Holiday Greetings from the
**OFFICERS and MEMBERS
of
LOCAL NO. 257
Ottawa, Canada**

Holiday Greetings

LOCAL NO. 488

I. A. T. S. E.

Harrisburg, Penna.

*A Happy Holiday
to Everybody from
PROJECTIONIST LOCAL 253
Rochester, N. Y.*

Holiday Greetings
**PROJECTIONISTS LOCAL NO. 650
Westchester County
New York**

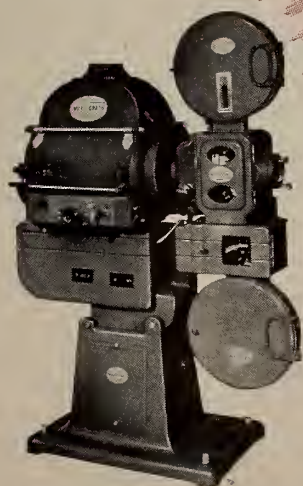


AN EDISON PICTURE

was shown in 1896 on Motiograph's first projector, the Optigraph. In 1908 Motiograph's Model "1A" was used for projecting "Uncle Tom's Cabin". In 1916 the Model "E", first motor-driven projector, was putting Griffith's "Intolerance" on screens. The Model "F" projected Rudolph Valentino's "The Four Horsemen of the Apocalypse"; the Model "H", in 1923, for "The Covered Wagon"; the Model "HU", in 1935, for "The Informer" and, in 1936, the Model "K" for "Mutiny on the Bounty". Motiograph has really grown up with the movies.

Many of these old Motiographs, still running, give promise of even more years of service. It seems you simply can't wear them out!

Now, with 54 years of know-how built in, the Motiograph is still unmatched. That's why theatre men today just naturally turn to Motiograph, the outstanding name in projectors, for the best—the last development in projectors.



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for removing dust and oil from theater trailers, date strips, etc. Not to mention its use in fire extinguishers (which should *not* be in any projection room).

I knew that carbon tet was more poisonous than chloroform; but I did not realize it was so bad—the effects of the former, while similar to the latter, are much more severe.

I still am interested in the bad effects of dioxane, and I fervently hope that the craft may depend upon the word of manufacturers of film cements that this ingredient is not used therein.

ROBERT A. MITCHELL

To the Editor of IP:

It is a great honor for me to write and thank you for the numerous technical materials you assembled and forwarded to me. Since the war, Japan has been striving to improve its culture, especially in the field of the motion picture. Through your excellent magazine, and other materials, we have learned that motion pictures have made outstanding progress since the war, especially in the educational and scientific fields.

Here in Japan we feel that we are ten years behind. We do not enjoy the facilities that you in America do—magazines, laboratories, etc.—or even a forum for regular meetings for discussion and work. In the 16-mm field we are far behind, but our goal is to reach at least the minimum standards of your country.

At present there are about 2000 theaters in Japan, with 40% of these showing American films. Your films are very popular and have great influence upon the Japanese, directly and indirectly. We hope in time to reach the high technical

WESTREX MANAGERS CONVENE IN N. Y.



Seven managers of Westrex Corp. foreign offices gathered around vice-president E. S. Gregg as he describes the new W. E. recording and scoring console. Left to right are: W. S. Tower, Jr., Australia; W. H. Meisel, Caribbean area; D. van Spankeren, Indonesia; H. v. Zeppelin, Argentina; J. J. de Boer, Cuba; D. L. Smith, Venezuela, and R. F. Crews, India. Conference spanned two weeks.

standards maintained in America.

KEINOSUKE NAKAJIMA

Tokyo, Honshu, Japan.

To the Editor of IP:

I was extremely interested in the exchange of views between James Card, assistant curator of George Eastman House, Inc., and Robert Mitchell which appeared in IP for October. I have read many books on the early history of the motion picture, but I have only once seen a reference to Leon Bouly, this being on page 150 of *Magic Shadows*, by Martin Quigley, Jr., published by the Catholic

University Press in Washington, D. C.

This reference was related to the statement that the Lumiere "Cinematographe" was patented on February 13, 1895, in France, and that the name was derived from a French patent issued on February 12, 1892, to one Leon Bouly, who evidently had an idea for a camera which was never reduced to practice. Mr. Card describes the Bouly "Cinematographe" as being patented in France in 1893 or '94, it having been a camera-projector that used an unperforated film slightly larger than 35-mm, with the intermittent taking the form of broken rollers.

Authoritative Book Needed

The years 1889-94 cover the motion picture experiments of such people as Wordsworth Donisthorpe, W. C. Croft, John Arthur Rudge, William Friese-Greene, Mortimer Evans, Lionel Beale, Georges Deamny and others, most of whom employed unperforated film strips.

I agree with Mr. Mitchell that someone should write a book on the motion picture projector covering the years 1889 up to the advent of sound motion pictures in 1927.

ROY BRIAN

Peoria, Illinois.

Altec Mini Mike Wins Award

Altec Lansing's miniature condenser microphone has been selected to receive an *Electrical Manufacturing Product Design Award* for 1950.

This microphone is the smallest ever offered on the market. Its size is smaller than a stack of five dimes. Although not offered until last year, already the Altec



miniature condenser microphone has found wide use in the theater, radio broadcast, television, public address and for scientific applications requiring unusual sensitivity. Its small size, which causes it to be practically invisible when used before performers on television and stage and by lecturers on the rostrum, has been one of the outstanding features resulting in its quick acceptance in all fields.

Season's Greetings

LOCAL NO. 380
MOVING PICTURE MACHINE
OPERATORS UNION

Oklahoma City, Okla.

Season's Greetings

MOVING PICTURE PROJECTIONISTS
LOCAL NO. 486 I. A. T. S. E.

Hartford, Conn.

Greetings and Best Wishes
from

The Officers and Members of
MOVING PICTURE MACHINE
OPERATORS LOCAL NO. 182

Boston, Mass.

Greetings —

LOCAL NO. 224

I. A. T. S. E.

WASHINGTON

D. C.

Season's Greetings

LOCAL UNION NO. 303

I. A. T. S. E. & M. P. M. O.

HAMILTON, ONT.
CANADA

Compliments of

MOVING PICTURE MACHINE
OPERATORS' PROTECTIVE UNION
LOCAL NO. 181, AF of L

BALTIMORE, MD.

Season's Greetings

NEW YORK STATE ASSOCIATION
of
MOTION PICTURE PROJECTIONISTS

Charles F. Wheeler, Secretary

Compliments of the Season

PROJECTIONISTS LOCAL NO. 199

DETROIT

MICHIGAN

Best Wishes for 1951

IA-IP Radio 'Ham' Contest Jan. 8-13

WITH the publication in this issue of a revised and greatly expanded list of IA-IP amateur radio enthusiasts, the decks are cleared for the big QSO contest which will be staged during the week of January 8-13, inclusive. Originally scheduled for September, the contest date was advanced to permit the inclusion of many more IA men and to assure that ample notice was given to all the boys through their regular contact.

Following are the frequencies selected by the IA gang as official calling channels.

The same rules as announced previously will apply to the forthcoming contest, it has been announced by Amos

The Call is "CQ-IA"

Phone	CW
28,850	28,150
14,270	14,150
3,950	7,250

Kanaga, Secretary of Local 409, whose tireless efforts have served to bring IA radio "hams" together. The rules are simple:

Rules, Frequencies for Contest

All contestants must be IA men; they must have on file with Amos their QSL cards or equivalents thereof, and, finally, a log sheet bearing Local Union affiliation and the time and date of QSO and the band used should be forwarded to

IA President Walsh's World-Wide Greeting via Radio 'Hams'

Following is the text of a greeting by IA President Richard F. Walsh which will be utilized by IA radio amateurs everywhere to effect world-wide coverage during the holiday season.

On behalf of the technicians behind the scenes in the theaters of America and those who make and project our moving pictures, I am happy to have this opportunity to say "hello" to the stage and screen workers of other lands. In these times when so much hatred and misery are abroad in the world, we are mindful that the spirit of good will has a stubborn way of surviving at theaters everywhere. It flows in through the doors with the patrons. It shines out across the footlights—and is reflected every day and night from untold thousands of screens.

At this season when the good will in every heart just naturally flows to the surface, I extend to you and all your countrymen the greetings of fellow workers in America. Best wishes for a joyous holiday season.

IA Radio Amateur of Month

Frank Larham, business representative of IA Local 108, Geneva, N. Y., is one of the sparkplugs who has contributed greatly to the fast-growing list of IA-IP radio amateurs published elsewhere herein. Frank, through his station W2CYQ, is constantly in touch with IA men all over the country in his capacity as East



Here is Frank (Marconi) Larham ready to take off into the wild blue yonder.

Coast collector of calls for the list. Starting off by playing with crystal sets in the early '20's, Frank got his ticket in 1928. He worked 20-40-80 CW and 160 phone before the war. Got his first-class ticket during the war and went on 75 when the bands were opened.

On the film projection end, Frank broke in at the tender age of 10, working on Powers 6A and 6B mechanisms. This covers quite a span of both time and experience, and today Frank is right up near the top as a fine projection craftsman.

Amos. Log sheets must be postmarked within five days after the contest ends. Participants need not be listed in the IA-IP roll herein, but they must be IA men.

Handsome certificates of merit will go to those participants in the contest who

finish in the top-ten bracket. These certificates will be suitably inscribed as to the nature of the contest and, in addition, will bear the signature of IA President Richard F. Walsh, Amos Kanaga, and a representative of IP.

Eastern aide of Amos and a top amateur radio enthusiast is Frank Larham (W2CYQ) business representative of Local 108, Geneva, N. Y. Frank talks with Amos frequently and he reports that a large number of IA men send in their call letters but fail to indicate on their QSL cards their IA Local affiliation—in-

formation which is requisite for inclusion in the official listing.

So, remember the dates fellows—January 8-13 inclusive—and be sure to get off your log sheets to Amos Kanaga, 262 Westland Ave., San Mateo, Calif., within five days after the contest ends. It is doubtful whether results of the contest can be included in IP for January, but the February issue will contain all the dope.

Don't Forget the Dates **IA-IP Contest: January 8-13**

Current IA-IP Amateur Radio Listing

CALL NAME LOCAL NO.

W1CBE C. J. Rowley—L. 459
W1EBO Woodrow Guile—L. 459
W1LW Norman Soules—L. 459
WINZE Arthur Madsen—L. 182
W1BHJ Otto Halquist—L. 182
W1WI Tom McNamara—L. 505
W1BVP Don Fancher—L. 439
W1IHY Harold Wyman—L. 96
W1JBU George Gravell—L. 96
W1BTW J. Roland Lizotte—L. 546
W1JWN Theodore Kahn—L. 86

W2TSN Victor Bufis—L. 365
W2WZX Erich Pattky—L. 244
W2CYQ Frank Larham—L. 108
W2ARP Fred Ramhorst—L. 534
W2NFU Sydney Trisch—L. 306
W2RUA Hugh Newcomb—L. 462
W2QYQ Alfred Beckett—L. 462
W2VSQ Frank Tamborel—L. 306
W2OCL Edward Ricca—L. 306
W2MYJ Mike Revzin—L. 306
W2ORS Charles Roop—L. 418
W2DZA Alex Knight—L. 353
W2AOM Jack Garritson—L. 306
W2NAJ Peter Hurgon—L. 306
W2AMB Fred Huff—L. 306
W2ZCE John V. Richards—L. 1
(formerly W3JAX)
W2RQZ Frank Lipinske—L. 337
W2HRZ Charles Beckett—L. 462
W2BOR William Axton—L. 524
W2HFW Albert Dietrich—L. 306

W3KNY Harris Good—L. 661
W3MEY Leo Foran—L. 335
W3BBV Nelson Stover—L. 283
W3JMA Ralph Rushworth—L. 181
W3PMY John Nordine—L. 296
W3MHE Charles Gibson—L. 444

W4HJC Arlie Belflower—L. 225
W4MCT Jim Davis—L. 552
W4NOM Buddy Rogers—L. 225
W4PKT M. H. Sanders—L. 507
W4CIU Bill Britton—L. 537
W4FGG Marvin Storler—L. 144

W4RFF Howard Ross—L. 574
W4KBJ James File—L. 290
W4MEP J. Wyatt—L. 793
W5IHP Pat Talbot—L. 249
W5DYV Bob Belian—L. 604
W5CQ Ray J. Morrow—L. 597
W5CQQ Rajmunt J. Machu—L. 597
W5IMT A. S. Johnstone—L. 293

W6BAA Amos Kanaga—L. 409
W6UZA Malcomb Keele—L. 150
W6DPU Roy Brann—L. 150
W6PFF Frank Champlin—L. 150
W6PQS Joe Wilson—L. 504
W6ALO Tom Jentges—L. 504
W6GTP E. Schwartz—L. 695
W6MTO Leroy Wardel—L. 762
W6DYJ Ed Pothier—L. 215
W6IV Delos Trim—L. 297
W6RKB Bob Gillespie—L. 241
W6YWC Lewis Howard—L. 162
W6EFL A. H. Whitney—L. 150
W6EAA E. L. Kline—L. 150
W6CAG August De Grazia—L. 150
W6CYW Frank Hemerlein—L. 150
W6KNI Cliff Schwander—L. 150
W6REH Harry Gould—L. 150
W6BPT Roy Pinkham—L. 431
W6FBW Frank Amarantes—L. 431
W6WPG Robert Hyde—L. 796
W6IDY Dom Lucido—L. 241
W6EP Leslie Hewitt—L. 695
W6HK Frank Creswell—L. 728
W6YDU C. R. Putnam—L. 490
W6BWI Harry Morse—L. 297
W6VTX Ralph Addy—L. 521
W6EIR Leroy Ward—L. 521
W6ZOK Max Miller—L. 521
W6FGV Norman Owens—L. 521
W6BEP C. C. Applegate—L. 187
W6WPG Robert Hyde—L. 796
W6ZEN Floyd McPherson—L. 709
W6FOP George Abrams—L. 297
W6AGN Arthur Hansen—L. 297
W6EWU Tom Wells—L. 297
W6YBC Hansen Cresap—L. 297
W6ZBX George Kiaser—L. 297
W6CZK Ray Baumann—L. 434
W6CML Tom Moore—L. 169

W6IYT L. H. King—L. 796
K6CH H. H. Quackenbush—L. 510
W6GCF Charles Busby—L. 599
W6HUE Homer Elias—L. 599
W6UVO Edward Ives—L. 150
W6WER Clarence Woerth—L. 150

W7LAT Fred Jones—L. 720
W7PEC Jim Harford—L. 720
W7AXY John Murphy—L. 91
W7ALM Chester Lamont—L. 446
W7FJZ Z. A. Sax—L. 159
W7HE Dee Hart—L. 91
W7HPF John Gilbert—L. 91
W7GXN Edwin McMurray—L. 180
W7IJJ Donald Johnston—L. 401
W7AVM J. Elmer Newell—L. 429
W7JTM J. Allen Evans—L. 294
W7OAS George Olson—L. 294
W7KMO James A. Furr—L. 294

W8VDP Jack Harwood—L. 160
W8BYT L. Grazier—L. 338
W8NS Carl Bacon—L. 199
W8WSL Denzel Murphy—L. 239
W8OWK Edw. Miller—L. 199
W8EEW Muriel Murtagh—L. 291
W8QIX E. W. McDonald—L. 199
W8QFK Jim Robinson—L. 64
W8BWU James T. Smith—L. 100

W9NLP Rolly Long—L. 110
W9OL W. P. Atchison—L. 323
W9NPG John Bain—L. 323
W9LBL R. B. Connelly—L. 110
W9EDW Harold Nelson—L. 221
W9RTA Herb Kleinbeck, Sr.—L. 110
W9FOL Merrill Smith—L. 110
W9AZA Kenneth Mass—L. 721
W9GQD Clarence Hawkins—L. 263

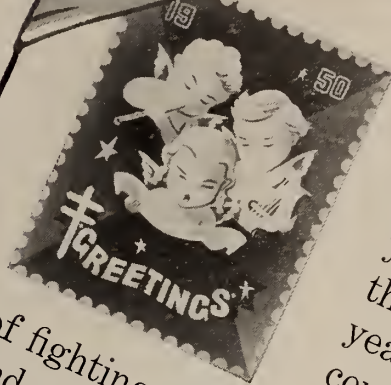
W0VGC H. F. Heckel—L. 230
W0ZIM M. Geiskiang—L. 230
W0GSW Jim Evans—L. 242
W0JSU John Cresap—L. 242
W0UOP Clair Rockholz—L. 286
W0WSH Herschell Allredge—L. 443
W0DOL E. M. Karcher—L. 482
W0SJK O. S. Keay—L. 219
W0BTT R. R. Kerwood—L. 586

CANADA:

VE3ABV Jack Snider—L. 173
VE3BAK F. Winkle—L. 173
VE3BVC E. H. Whyat—L. 173
VE3BWG Lou Lodge—L. 173
VE3DBF M. Winslow—L. 461
VE3OG H. Horner—L. 173
VE3TE Tom Burrows—L. 173
VE3APR Harry McClelland—L. 582
VE5JK Jack Kyle—L. 295
VE7OT M. Thoreau—L. 348
VE7US C. Moorehouse—L. 348
VE7MN C. H. Richards—L. 348
VE3AYQ Cecil D. O'Neill—L. 461
VE5RJ Ron Marchant—L. 300
VE3AHJ Walt Mann—L. 467
VE7ALW Merle Wilson—L. 348

[NOTE: Additions and corrections should be sent to AMOS R. KANAGA (W6BAA), 262 Westland Ave., San Mateo, Calif.]

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traverse
afar..."



Most of us think of Christmas Seals only during the holiday season... yet thousands see the good they do throughout the year and throughout the country.

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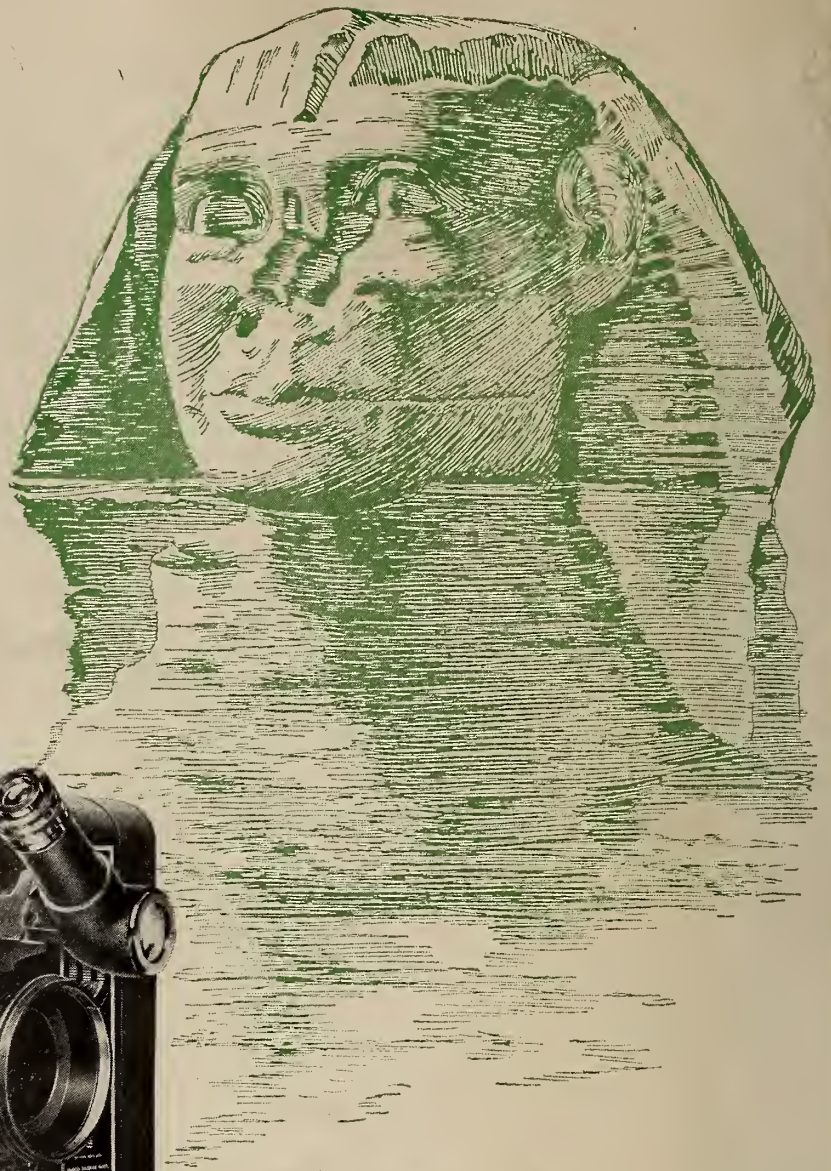
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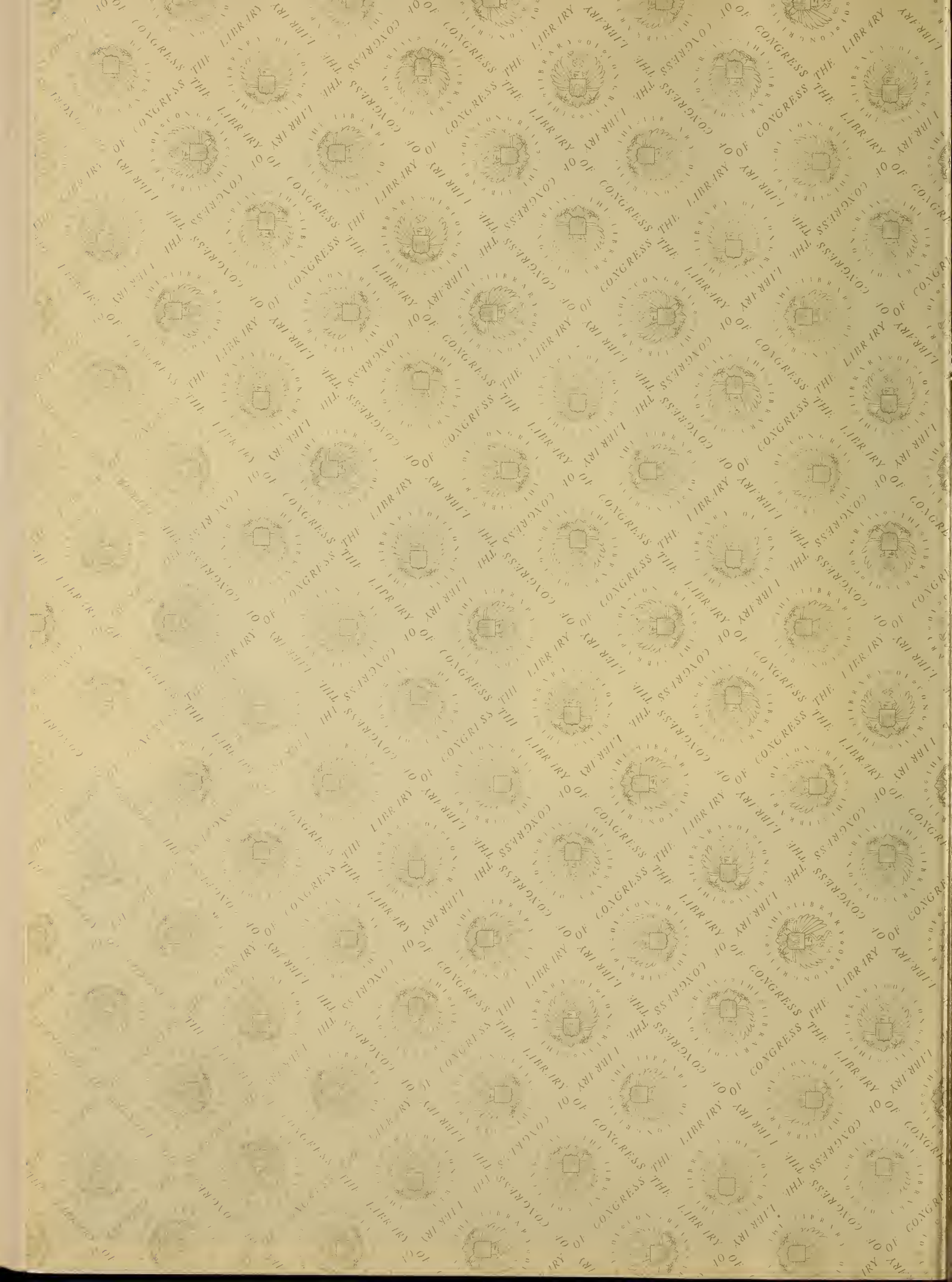


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